Tanaffos (2008) 7(3), 63-68

Epidemiologic Status of Tuberculosis in Golestan Province

Salek Salek [1], Solmaz Salek [1], Habib Emami [2], Mohammad Reza Masjedi [3], and Ali Akbar Velayati [4]

[1] Clinical Tuberculosis and Epidemiological Research Center, [2] Tobacco Prevention and Control Research Center, [3] Department of Pulmonary Medicine, [4] Department of Pediatrics, NRITLD, Shahid Beheshti University, M.C., TEHRAN-IRAN.

ABSTRACT

***Background**: After Sistan and Balouchestan, Golestan province is ranked second in terms of TB prevalence in Iran. Therefore, a 5-year study was conducted to evaluate the alterations of TB epidemiologic indices in this province.*

***Materials and Methods**: This was a trend study. All patients suffering from various forms of pulmonary tuberculosis (smear positive, smear negative, extrapulmonary and miliary) during 1999-2003 in Golestan province were studied. Alterations of TB epidemiologic indices were evaluated by using Chi-square test.*

***Results:** Out of a total of 3,417 registered TB patients during 1999-2003 in the Center for Communicable Disease Control in Golestan, 2,773 (81%) were available and entered the study; 47% were male. 62.7% of patients had smear positive, 16.4% had smear negative, 20.7% had extrapulmonary and 0.1% had miliary tuberculosis. The overall incidence of all forms of TB during the study period was 36 in 100,000 and no significant difference was detected while assessing the alterations of this index during the study period. Incidence of TB had an increasing trend among children; its prevalence among 0-14 year old females was higher than males during the study period.*

Conclusion:** Although Golestan province is not adjacent to the provinces with high TB prevalence, it is ranked second in terms of incidence and prevalence of TB and various factors such as immigration can affect TB epidemiologic indices. An independent study is required to evaluate the distribution of TB among different ethnic groups.* ***(Tanaffos 2008; 7(3): 63-68)

***Key words:** Tuberculosis, Pulmonary, Extrapulmonary, Epidemiology, Golestan province*

INTRODUCTION

Evaluation of the alterations of epidemiologic indices within a specific time period in any country can reveal several influential factors and assess the efficacy of preventive programs. TB is a chronic bacterial disease which is caused by *Mycobacterium tuberculosis* species and less commonly *Mycobacterium bovis* and *africanum* (1). This disease is usually manifested in 2 forms: pulmonary and extrapulmonary. The pulmonary form alone is seen in 85% of TB cases (2). One third of the world's population is infected with TB bacilli; 90% of them live in undeveloped countries. In 2004, of 8.9 million new TB cases world wide, 3.9 million had smear positive pulmonary tuberculosis (3). The main source of infection is a smear-positive TB

Correspondence to: Salek Solmaz
Address: NRITLD, Shaheed Bahonar Ave, Darabad, TEHRAN 19569, P.O:19575/154,TEHRAN- IRAN
Email address: solsalk@yahoo.com
Received: 10 December 2007
Accepted: 23 June 2008

patient who coughs (4). Various factors are involved in the body's defense against TB bacilli including: age, sex, malnutrition, tobacco use, alcoholism, corticosteroid drugs, infectious diseases (i.e. HIV), poverty and ethnicity (5).

In 1990 a study was conducted to evaluate the efficacy of implementation of TB control programs by the Health Ministry Surveillance System and proved the effectiveness of these programs. The overall incidence of TB decreased from 42.9/100,000 in 1992 to 13.9/100,000 in 2005 (6,7). This rate was 41/100,000 in the east Mediterranean region in 2003 (3).

The incidence of TB is not uniform in all parts of the country. In 2005, border-line provinces such as Sistan and Baluchestan, Golestan, Khorasan, Hormozgan and Khuzestan had a high prevalence of TB with rates of 44, 38, 25, 25 and 19 in 100,000 respectively while central areas had a low incidence of TB (6). Golestan province with an area of 20,437.7 square Kilometer with 11 districts is located in the north-east of the country and southeast of Caspian Sea. It had a population of 1,623,603 people in 2003 and according to the statistical reports, a considerable variety of ethnic groups is seen in this province because this province hosts a large number of immigrants. Although all parts of the country are under surveillance by a comprehensive TB control program, incidence of TB is not uniform in all parts of the country.

Although Golestan province is not adjacent to the provinces with high TB prevalence, in 2005 it was ranked second in terms of incidence and prevalence of TB with a rate of 38.1 in 100,000. Sistan and Balouchestan with a rate of 44.1 in 100,000 was ranked first in regard to the overall TB incidence.

Whereas, Mazandaran province neighboring Golestan province with a similar ecosystem has a TB incidence of 9.6 in 100,000 which is a much lower rate.

Considering the special status of Golestan province, we decided to study the alterations of TB epidemiologic indices in this province in a 5-year period.

MATERIALS AND METHODS

In this trend study all patients suffering from any form of smear positive, smear negative pulmonary, extrapulmonary or miliary tuberculosis during 1999-2003 in Golestan province were enrolled and studied. Data were collected by using a 6-section questionnaire with a total of 150 different questions. Data were analyzed and compared by using SPSS software.

Under-study population: All patients with any form of tuberculosis who had been registered in TB registry offices of any town in this province in one of 3 forms: new case, recurrence and treatment failure were studied. A number of them were excluded from the study because no information was available about them except their first and last names. Under study patients were privately interviewed face to face after obtaining consent.

The TB coordinator physician of each town filled out the previously designed questionnaire.

Evaluations: Evaluation was performed by a questionnaire designed in 6 sections. Section one included demographic characteristics of the patients such as: first and last name, age, sex, marital status, form of pulmonary tuberculosis (smear positive and smear negative), extrapulmonary, and military TB as well as type of disease in terms of new case, recurrence and treatment failure. In this section some questions about the pervious anti-tuberculous treatment were also asked. In the second section characteristics of the patient's family members were recorded. In the third section the economical, social and cultural status of the patient were evaluated. This data included: occupation, educational level, monthly income and address of the patient. In the 4th section data regarding ethnicity, place of birth and place of residence were documented. The fifth paragraph included data regarding onset of symptoms, medical

centers into which the patient was admitted, place of diagnosis and treatment. In the sixth section, the follow-up status in terms of patient's compliance to treatment and treatment outcome was recorded. The questionnaire was filled-out and signed by the TB coordinator physician of each town.

Statistical analysis: Trend of linear alteration regarding contracting one of the different forms of TB and cases of recurrence during the study period was studied by chi- square test for trend. Incidence of smear-positive pulmonary tuberculosis in Golestan province was compared with the country average and high or low prevalent areas during 1999-2003. Percentage of new cases, recurrence and treatment failure were evaluated and compared with the overall incidence rate. Gender and age distribution of different forms of disease were also evaluated during the study period.

RESULTS

Of 3,417 registered TB patients between 1999-2003 at Center for Communicable Disease Control of Golestan province, 2,773 (81%) were available and entered the study; out of which 1,306 (47%) were male. The patients were divided into 4 groups of smear positive pulmonary tuberculosis (1378 people, 62.7%), smear-negative pulmonary tuberculosis (454 persons, 16.4%), extrapulmonary TB (573 people, 20.7%) and miliary tuberculosis (3 persons, 0.1%). Incidence of all forms of TB during 1999-2003 was 34, 37.2, 32.5, 37.3, and 36.2 in 100,000 respectively. But no significant difference was detected in this regard. Incidence of smear-positive pulmonary tuberculosis decreased from 21.9 in 100,000 in 1999 to 19.9 in 100,000 in 2003. Incidence of extrapulmonary tuberculosis increased from 7.2 to 7.7 during the same period and rate of recurrence decreased from 1.8 to 1.3. There was no significant difference between the above-mentioned figures. Incidence of smear-negative pulmonary tuberculosis increased from 4.9/ 100,000 in 1999 to 8.6/100,000 in 2003. This difference was statistically significant ($p<0.001$, Figure 1). According to the reports given by the Communicable Disease Control Center of the country, among the districts under surveillance by medical colleges all over the country, the area under surveillance by Golestan province medical colleges is ranked third in regard to the prevalence of TB all over the country. Zabol Medical School was ranked first followed by Sistan and Balouchestan Medical College. According to the classification based on province, Golestan is second in terms of TB prevalence after Sistan and Balouchestan (Figure 2).

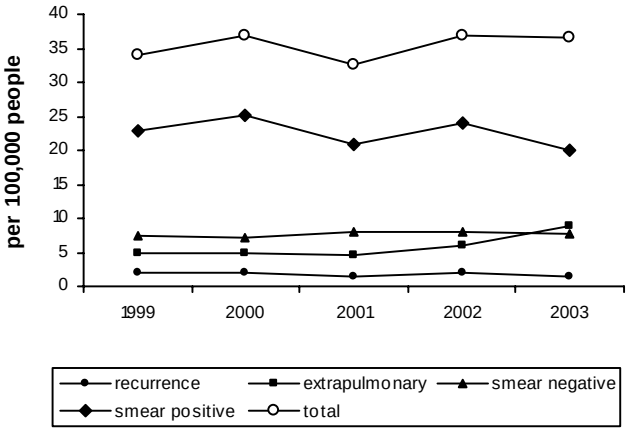

Figure 1. Incidence of different forms of TB and the recurrence rate in Golestan province 1999-2003.

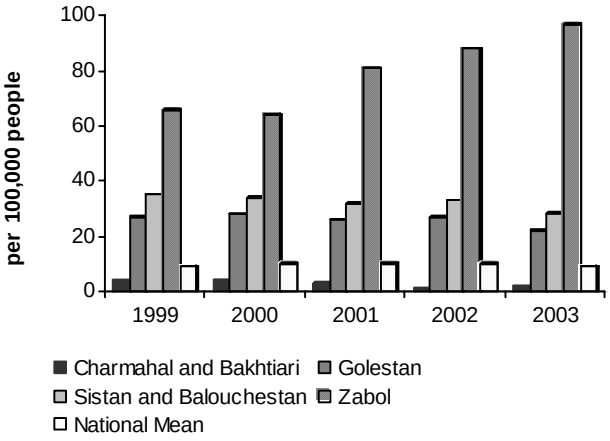

Figure 2. Comparison of the incidence of smear positive pulmonary tuberculosis is Golestan with the national mean and the high and low prevalence areas in the country during 1999-2003.

The mean population of this province during the study period was 1,560,287 people. During the study period, there were 92.7% new TB cases, 4.7 % recurrence and 2.6% treatment failures (Table 1).

Table 1. Classification of registered patients in Golestan province during 1999-2003.

Year	Population of Golestan	New cases No. (%)	Recurrence No.(%)	Failure No.(%)	Total
1999	1507496	473(93.3)	27(5.3)	7(1.4)	507
2000	1534944	512(91.8)	33(5.9)	13(2.3)	558
2001	1558980	463(93.2)	19(3.8)	16(3.2)	498
2002	1589802	524(92.6)	27(4.8)	15(2.6)	566
2003	1610216	509(93.1)	21(3.8)	17(3.1)	547
Total	7801438	2481(92.7)	127(4.7)	68(2.6)	2676

Five cases of multi-drug resistant tuberculosis (MDR-TB) were detected out of which 4 recovered and one died as the result of this condition.

Mean 5-year incidence of TB among the elderly was 33.5 times greater than in children and 3.9 times greater than those in their functional age. Incidence of TB among the elderly, children and those in their functional age was 151, 4.5 and 39 in 100,000 (Figure 3).

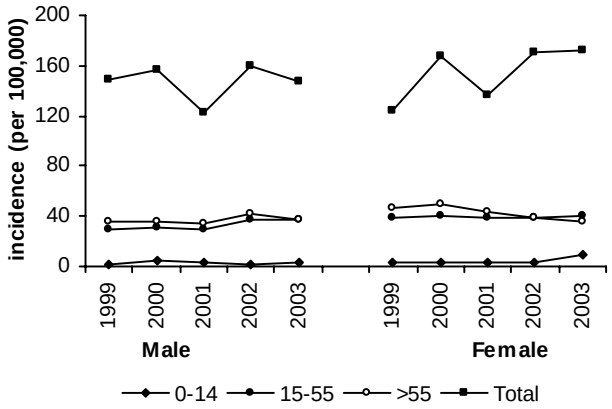

Figure 3. Incidence of all forms of TB based on age and sex in Golestan province during 1999-2003.

Incidence of TB among women in their fertility age was higher than men of the same age but this difference gradually decreased during the study period and eventually in 2003 the incidence of TB among women and men reached 36.5 and 34.7 in 100,000.

Incidence of TB among children had an ascending trend during the study period and showed a significant difference (P<0.01). TB incidence was higher in girls aged 0-14 years compared to boys. In 1999, the incidence of TB in 0-14 year old girls was 4.2 in 100,000 compared to 1.8 in 100,000 in boys. In 2003, these rates increased to 10.4 and 4.4 in 100,000 in girls and boys respectively which showed a statistically significant difference (P=0.01)

Recovery, success and treatment failure rates of smear-positive pulmonary tuberculosis patients and the overall morbidity and mortality rate of all forms were 87, 89, 2 and 5 percent respectively. These rates were 86, 90, 1 and 6 percent respectively in 2003 (Figure 4). Causes of death occurring during 2001-2003 were also studied and 33, 27 and 28 percent of deaths were due to TB in the years 2001, 2002 and 2003 respectively.

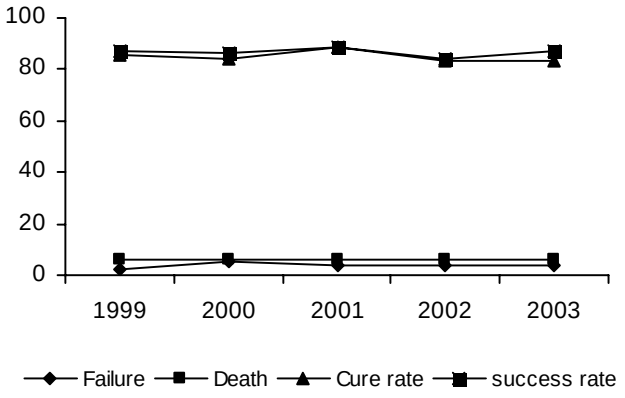

Figure 4. Treatment outcome of smear positive TB patients and the mortality rate in Golestan province during 1999-2003.

DISCUSSION

Despite the implementation of national TB control program, it is still considered a health hazard in Golestan province and we did not witness significant decrease in the incidence rate of this disease during

the study. A similar study in Mexico demonstrated that despite the enforcement of TB control program during 1991-1994 including BCG vaccination at birth, case detection by sputum smear and implementation of DOTS strategy incidence of TB in this country (42.6/ 100,000) did not change significantly during the study period (8). In our study, we only noticed significant increase by 2 folds in the incidence rate of smear-negative pulmonary tuberculosis. The reason may be the fact that stronger enforcement of TB control programs resulted in higher detection of smear-negative cases.

National case detection rate (CDR) in 2003 was 60% considering the expected incidence rate of 13/100,000. Incidence of smear-positive pulmonary tuberculosis in Golestan and national incidence rate in the same year were 22.1 and 7.8 in 100,000 respectively. If we consider the CDR of the province to be equal to that of the country and also consider the reported 22.1/100,000 incidence rate of the smear-positive TB in Golestan province in 2003 to be about 60% of its actual incidence rate, the expected actual incidence rate of smear-positive TB in this province will be 36.8/100,000.

In our study, 80% of the cases had pulmonary and the remaining had extrapulmonary tuberculosis. These rates are in accordance with international rates and this is also true about the smear-positive cases.

The very high ratio of new TB cases to the total registered cases during the study period indicates that the quality of healthcare services offered to the patients in this province has been satisfactory and the treatments have been effective because inadequate or irregular treatment of patients always results in treatment failure or recurrence.

High incidence of TB among those over 55 years and its low incidence in those below 14 years are indicative of the successful TB control program during the study period and earlier. This is due to the decreased sources of infection (adult smear-positive pulmonary tuberculosis patients) and consequently smaller chances of children contacting these patients. Infection in the elderly has occurred during their childhood or adolescence and this pattern is similar to that of low prevalence countries (9).

TB incidence has always been 4-6% higher among women during the study period except in the year 2002. The international prevalence of TB is higher among men (10) but the statistical evaluation in our country during 1991-2000 showed a reverse pattern. This difference gradually changed from the late 1960s as the result of changes in the women's social status (i.e. increased number of literate women and improved occupational status) and easy access of all people in any part of the country to healthcare centers. At present, the number of male TB patients is higher than females. Pattern of prevalence of TB among both sexes in Golestan province during the study period was similar to TB frequency distribution pattern before the year 2001 which was indicative of the unchanged social status of women in this province.

The healthcare system in Golestan province has been successful in treatment of detected and registered cases (similar to most other provinces). However, in units outside this network there are usually problems in treatment due to the lack of facilities for follow-up and observation of therapy and since incomplete treatment may result in emergence of MDR-TB cases, this issue should be evaluated and further studies are required to assess treatment outcome.

Since Golestan is a high prevalence province in terms of TB due to the various ethnicities and immigration, an independent study is required to evaluate the distribution of TB based on ethnicity and we hope epidemiologic studies provide us with more information regarding TB status in this province.

Acknowledgment

We would like to thank Dr. Sedaghat, chief of the communicable disease control center of Golestan province, and Mr. Hamid Angizeh, technician of the communicable disease control of Golestan and TB coordinator physicians of Golestan province.

REFERENCES

1. World health organization. TB/HIV, a clinical Manual. 2nd ed. Geneva: The Institute: 2004.
2. Salek S, Mohraz M, Siadati SA, Masjedi MR, Zarifi A, Mansoori SD. National guidebook for TB control. 1st edition-Tehran-Seda Pub.2002.
3. World Health Organization. WHO report 2006. Global Tuberculosis Control; Surveillance, Planning, Financing. Geneva: The Institute; 2006.
4. Clinical guidebook of TB and AIDS. Health Ministry, Center for Disease Control. 1st edition. Tehran. Ilia publication 2006.
5. Crofton J, Horne N, Miller F. Clinical tuberculosis Translated by Khaje dalooei M, Heidarnajad H. 2nd edition. Tehran. Disease control and Prevention Office 2000.
6. Annual statistics of TB cases in 2005. Ministry of Health Center of Communicable Disease Control. Tehran, TB and Leprosy office, Sep 2006.
7. Annual statistics of TB cases in 1992. Health Ministry, Center for Disease Control, Tehran. TB and Leprosy office. Sep 2003.
8. García-García ML, Small PM, Garcia-Sancho C, Mayar-Maya ME, Ferreyra-Reyes L, Palacios-Martinez M, et al. Tuberculosis epidemiology and control in Veracruz, Mexico. ***Int J Epidemiol*** 1999; 28 (1): 135- 40.
9. Khazaei HA, Rezaei N, Bagheri GR, Dankoub MA, Shahryari K, Tahai A, Mahmoudi M. Epidemiology of tuberculosis in the Southeastern Iran. ***Eur J Epidemiol*** 2005; 20 (10): 879- 83.
10. World Health Organization. Tuberculosis and gender. Available at: http://www.who.int/tb/dots/gender/en/.