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Trend of Smear Positive Pulmonary Tuberculosis in Sistan and Baluchestan Province (2005-2008)

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ABSTRACT

Background: *According to the World Health Organization (WHO) report in 2008, incidence of tuberculosis in Iran is 25-49/100,000 cases per year. Based on the guidelines of the Ministry of Health, case detection index for smear positive pulmonary tuberculosis (SPP-TB) has reported to be 11/ 100,000 in Iran in the year 2006. Sistan and Baluchestan Province has the highest rate of SPP-TB in Iran. This study aimed to evaluate the trend of incidence of SPP TB from 2005 to 2008,taking into consideration the interventions (started in the beginning of 2006) implemented by the Zahedan University of Medical Sciences to reinforce the screening system and evaluate the case detection index in this province.*

Materials and Methods: *The understudy population comprised of the whole community under medical coverage of Zahedan University of Medical Sciences. Screening was mainly conducted passively till the end of 2005. Since the early 2006, some interventions have been conducted to reinforce the active screening system. All the information regarding the new cases of SPP-TB from 2005 to 2008 was collected from the Center for Disease Control of Sistan and Baluchestan Province. Changes in trend of SPP-TB incidence were analyzed by using Time Series analysis considering the interventions and related effective factors.*

Results: *As a result of interventions aiming at reinforcing active screening since 2006, there has been a significant increase in both the incidence rate and case detection index. However, the incidence rate decreased in 2007.By using "Time Series Analysis for evaluation of the trend of incidence during the study period, the incidence of TB was estimated to be 22.88 cases in 100,000 in 2009.*

Conclusion: *If we overcome the existing shortcomings regarding the screening system of SPP TB, successful case detection index should be higher than 22.88 in 100,000.* ***(Tanaffos2010; 9(1): 48-53)***

Key words: *Pulmonary tuberculosis, Smear-Positive, Sistan and Baluchestan province, Trend*

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INTRODUCTION

According to DALY criteria, tuberculosis (TB) is ranked 7th in terms of global burden of diseases and is estimated to remain at the same level till 2020. Unfortunately, 95% of TB cases and 98% of TB related deaths occur in developing countries and 75% of which occur in the economically active age groups (15-50 yrs) (1, 2). The main objective of the WHO is to decrease the burden of disease for tuberculosis by 2015 to 50% of its level in 1990. The WHO also aims to reduce the global incidence of active TB to less than 1/1,000,000 per year by 2050 (3).

According to the WHO report, the annual incidence of TB in Iran was 22/100,000 in 2007; whereas, this rate was 100-299/100,000 and >300/100,000 for the neighboring countries Pakistan and Afghanistan, respectively. According to the same report, case detection rate for new TB cases was 7, 54 and 49 in 100,000 in Iran, Pakistan and Afghanistan, respectively (3). Considering the guidelines of the Ministry of Health, the notification rate for TB was reported to be 11/100,000 cases in 2006 (4).

Sistan and Baluchestan Province has the highest incidence of TB in Iran (4-6). The two neighboring countries, Pakistan and Afghanistan have a much greater incidence of TB compared to Iran. Therefore, high incidence of TB in Sistan and Baluchestan Province might be due to the immigration and travelling of Pakistani and Afghan residents to this Eastern province. Considering the high incidence of TB in the neighboring countries, it seems that the case detection index of 11 in 100,000 reported by the Iranian Center for Disease Control affiliated to the Ministry of Health is much lower than the actual rate.

Lack of adequate awareness and sufficient knowledge about the signs and symptoms of pulmonary tuberculosis, economical and cultural poverty and not seeking or delay in seeking medical care are mainly responsible for late diagnosis or undiagnosed cases of smear positive pulmonary tuberculosis which consequently results in unsuccessful passive screening and further spread of disease in this province.(7)

This study aimed to evaluate the alterations in trend of TB incidence from 2005 to 2008 considering the interventions being conducted by the Zahedan University of Medical Sciences since early 2006 to reinforce the screening system. We also studied the influential factors in this respect.

MATERIALS AND METHODS

This was a cross-sectional study conducted on the whole community (Sistan and Baluchestan residents) under medical coverage of the Zahedan University of Medical Sciences (Zabol City and its suburbs were excluded from this study because they were under medical coverage of Zabol University of Medical Sciences).

Data regarding the new cases of smear positive pulmonary tuberculosis (SPP-TB) from 2005 to 2008 were collected from the center for disease control (CDC) of Sistan and Baluchestan province. The process of diagnosing the new cases of SPP TB was as follows:

All suspected cases with persistent cough for 3 weeks or more who had sputum production and sometimes bloody sputum were evaluated. The diagnosis of pulmonary tuberculosis would be confirmed if the patient had 2 sputum smear tests positive for acid fact bacilli (AFB).

The case detection rate for new cases of SPP TB is defined as follows:

Number of new SPP-TB cases per year is equal to the mid-year population covered by the Zahedan University of Medical Sciences times 100 divided by the estimated number of SPP-TB cases (estimated incidence rate) among the same population in the same year.

Incidence rate for new cases of SPP-TB in

100,000 persons is defined as follows:

Number of new SPP-TB cases reported per year is equal to the population covered by the Zahedan University of Medical Sciences times 100,000 divided by the mid-year population covered by this university.

To reach a diagnosis, 3 sputum samples were obtained from suspected cases during 2 to 3 days and were assessed microscopically according to the national TB program and WHO guidelines. Samples were immediately transferred to the laboratory. If one of the samples was positive for AFB and the patient had clinical and radiological symptoms of TB, treatment of TB would be started according to the physician's clinical judgment.

In children, if the smear of the gastric juice was positive for AFB, the patient would be registered and reported as a case of smear positive pulmonary tuberculosis and treatment would be started for them.

It should be mentioned that in this study screening was mainly passive till the end of 2005. In early 2006 the screening system was reinforced and some interventions were applied to activate the screening method including educating people residing in high risk areas about the signs and symptoms of pulmonary tuberculosis, detecting suspected cases of TB in prisons, examining HIV positive patients for TB, examining family members of TB patients especially children, examining low income families for TB (covered by the charity organizations like Imdad Committee), implementation of active screening in Health Clinics located in the Eastern borders of Iran and executive and financial encouragement of personnel who did a better job in detecting pulmonary TB cases. Trend of alterations in the incidence of SPP TB was analyzed using Time Series Analysis considering the interventions and effective factors in this regard. Data collection performed as census which has some limitations for specific statistical analyses. Therefore, we used Bootstrap method in SPSS ver. 16 software to randomly select samples among all the collected data.

RESULTS

The incidence of smear positive pulmonary tuberculosis and case detection rates during 2005-2008 are summarized in Table 1. The incidence rate was compared in 8 age groups (<10 yrs, 10-19 yrs, 20-29 yrs, 30-39 yrs,40-49 yrs, 50-59 yrs, 60-69 yrs and >70 yrs). The incidence rate increased by aging and the highest incidence belonged to the age group of over 70 yrs ($P<0.05$).

Table 1. Incidence of SPP-TB and the case detection rate during the years 2005-2008 with the confidence interval (CI) of 95%

Year	Number of new SPP-TB cases*	Incidence rate in 100,000 (CI=95%)	Case detection index
2005	338	18.96 (19.11-18.80)	170%
2006	399	21.78 (22.08-21.47)	197%
2007	452	24.42 (24.57-24.27)	221%
2008	443	22.88 (23.60-22.16)	208%

* smear positive pulmonary tuberculosis.

Table 2. Incidence of SPP-TB in 100,000 persons in Sistan and Baluchestan during 2005-2008

Year	Incidence of TB in 100,000							
	Zahedan	Khash	Iranshahr	Saravan	Chabahar and Kenarak	Sarbaz	Nikshahr	Total
2005	23.3	12	16.86	10.06	30.21	20.63	9.49	18.96
2006	27.27	13.74	18.46	12.42	33.47	21.51	12.49	21.78
2007	31.6	16.86	14.26	28.32	31.67	28.01	3.15	24.42
2008	27.03	17.73	17.91	23.56	23.98	29.33	10.9	22.88

The highest incidence was seen among women. Also, incidence of TB was greater among the foreign immigrants compared to Iranians and among the urban population compared to the rural population ($p<0.05$).

Time series analysis was used to evaluate the trend of alterations in the incidence of SPP-TB during the study period. The estimated incidence of TB for the year2009 is depicted in Figure 1 and Table 3.

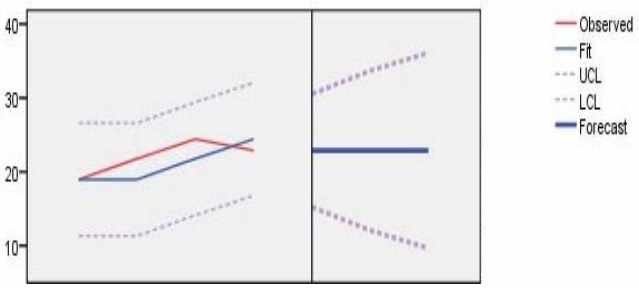

Figure 1. Estimated incidence of SPP-TB for the year 2009 (p=0.14).

Table 3. The estimated incidence of SPP TB based on Time Series analysis for 2009.

Incidence in 100,000		CI=95%	
Sistan and Baluchestan Province	22.9	15.24	30.5
Zahedan	27.0	16.13	37.9
Khash	16.4	9.79	23.0
Iranshahr	14.8	9.6	19.9
Saravan	32.7	3.2	62.2
Chabahar and Kenarak	28.8	13.69	43.9
Sarbaz	29.3	17.04	41.6
Nikshahr	9.9	0	24.1

DISCUSSION

According to the guidelines of the Ministry of Health and the WHO, passive screening is the main screening method for SPP TB. The national case detection rate has to be 11/100,000 persons in order for the national screening program to be successful (4). Different incidence rates for SPPTB have been reported for different provinces but the highest incidence rate belongs to the Sistan and Baluchestan Province which is most probably due to the uncontrollable immigration of the Pakistani and Afghan residents to this province(5). Therefore, it is justifiable that the successful case detection rate for this province should be much higher than the national rate.

As mentioned earlier, passive screening was the only method employed in 2005 and therefore, the incidence rate was much higher than the national incidence rate and the case detection rate for this province was 170% of the national case detection rate. Sistan and Baluchestan province still has an incidence rate higher than the mean national incidence rate for TB (11/100,000). Therefore, it is recommended that this province be evaluated separately in TB related studies.

It is also noteworthy that interventions started in early 2006 were not systematic. For example, active screening was performed only in some high risk groups including HIV positive cases and families with low socio-economical status (under the care of charity foundations). Only soldiers and prisoners were educated regarding the signs and symptoms of TB and executive and financial encouragement was for the medical personnel who detected the most number of TB cases. Some of these interventions were performed non-continuously or for a short period of time mainly because of the change of personnel and lack of expert physicians. Also, we could not analyze the data based on the method of active or passive screening because sometimes personnel would register a case of passive screening as active to get the reward. Furthermore, there were some patients who presented to the clinic as the result of their newly gained knowledge regarding the signs and symptoms of TB (which was part of the active screening interventions) and they were

registered as cases of passive screening. Therefore, we were only able to evaluate the effect of interventions on the total incidence rate.

Due to the interventions started in early 2006 aiming to reinforce the screening system, incidence and case detection rates increased significantly. However, these rates decreased in 2008. An optimistic explanation would be that active screening and proper treatment methods resulted in decreased prevalence of TB. But a more precise scrutiny reveals many of the enforcement problems and offers a more rational justification. Most physicians are not willing to work in the TB Units of Health Clinics and many of the TB units were remained unsupervised with no physician in charge in many health care centers of Sistan and Baluchestan Province. Lack of expert personnel was a big problem. There were general practitioners who were assigned to work there as part of their educational duty but their 2-year assignment would come to an end by the time they gained some experience and they would be replaced by recruits. It resulted in decreased sensitivity of the health system regarding active screening interventions. There were only 2 cities, Saravan and Sarbaz, which kept a steady, ascending trend of incidence during the 4 years of study and after further evaluation it was revealed that both cities had sufficient number of expert physicians and trained personnel in their centers for disease control. Evaluation of the incidence rates during the 4 years of study revealed higher incidence of SPP-TB among females, urban population, and foreign immigrants. To improve case detection status, interventions should also include women, urban population, foreign immigrants, and the elderly.

In a study conducted in Fars Province on Afghan immigrants, incidence of TB was reported to be 96.2, 88.2 and 63.5 in 100,000 persons in the years 2000, 2001 and 2002, respectively (8). In our study, incidence rate of TB among the immigrant population was 42.05, 65.82, 64.99 and 60.57 in the years 2005, 2006, 2007 and 2008, respectively. These rates are consistent with the incidence rate reported by the aforementioned study for the year 2002.

In another study conducted in Qatar on immigrant workers, the highest prevalence of TB was seen among Indian and Pakistani immigrants (9).

According to a study by Masjedi and colleagues in Tehran, Iran, patients' delay in seeking medical care was 12.5 ±10 days after the appearance of first signs and symptoms of TB. This delay was significantly longer in males compared to females. According to the same study, number of days wasted due to the physician's delay in diagnosing the disease was 93±80 days which were mostly the case in female patients. This study also emphasizes on the importance of sufficient training for physicians, continuing education programs and revision of medical training programs (10). Khan K and colleagues studied TB patients in Ontario, Canada and concluded that experience, expertise and knowledge of physicians about TB and follow up of patients had a positive effect on increasing the survival rate of TB patients (11). These studies all emphasize on the important role of expert and trained medical personnel. In our study, the reason for the decreased case detection rate in 2008 was lack of trained physicians and expert medical personnel.

Considering the strength and weaknesses of the screening system employed for detection of SPP-TB patients in Sistan and Baluchestan Province, Times Series analysis estimated the incidence of TB to be 22.88 in 100,000 persons with CI=95%, in 2009 (p=0.14). However, the insignificant statistical difference might be due to the small number of study years in Times Series analysis and also the result of decreased incidence rate in2008 despite its ascending trend during the previous years. However, insignificant statistical difference does not affect its

clinical importance and these rates can be used for future strategy planning for the reinforcement of active screening.

CONCLUSION

With sufficient number of expert physicians and medical personnel, creating motivation and support of authorities and organizations involved, the successful case detection rate for Sistan and Baluchestan Province should be at a level higher than 22.88/100,000.

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