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Chronic Cough and Pulmonary Tuberculosis in the Urban Population of Rudsar-Iran

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ABSTRACT

***Background**: One of the most important subjects for health services is the estimation of the prevalence of pulmonary tuberculosis (particularly sputum – smear positive pulmonary tuberculosis cases). We suppose that there is a possible correlation between the prevalence of chronic cough and the sectional prevalence of pulmonary tuberculosis.*

***Materials and Methods**: A cross-sectional study was carried out in Rudsar in the year 1999. Rudsar is a town with a total population of 82658, 19505 families, which includes 2018 (2.44%) people, having history of more than 2 weeks cough, based on our census. Individuals with more than 2 weeks cough were eligible for this study. Tuberculosis suspects were referred to district health center, for each suspicious case, diagnostic procedures such as physical chest examination evaluation of BCG status, three sputum smears and, if needed, CXR were performed.*

***Results**: Of 2018 individuals, 594 (29.4%) had typical scar of BCG. Chronic cough was confirmed by clinical work up in 761 participants. Among them, 403 patients (0.47% of Rudsar population) presented with productive cough sputum specimens were taken. Chest radiographs showed characteristic pulmonary tuberculosis lesions in 13(16.7%) of 79 patients in whom radiography was done on the basis of clinical findings. Five patients were diagnosed as sputum-smear positive pulmonary tuberculosis, and 3 new smear cases were diagnosed as new smear- negative TB cases. Sectional prevalence of sputum-smear positive patients and pulmonary tuberculosis between March 21 and June 20, 1999 were 8.5 and 12.1 in 100000 population respectively. If patients who were diagnosed within 9 months after the end of our study, according to health service system census, are taken into consideration, these rates will run to 30.25 and 47.12 respectively. Sensitivity, specificity, Positive Predictive Value (PPV), and Negative Predictive Value (NPV) for sputum smear and chest radiography were 62.5%, 100%, 100%, 94.4% and 100%, 92.9%, 61.5%, 100% respectively.*

In regard to diagnostic role of sputum – smear and chest radiograph in pulmonary TB, the difference between PPV (p=0.000), specificity (p= 0.03) and sensitivity (p = 0.000) was significant. Likelihood ratio for chest radiograph (34.26) was greater than sputum-smear (23.66)(p =0.000).

***Conclusion**: Only 20% of the patients with pulmonary tuberculosis were identified via health service system (HSS) screening method in Rudsar, and the rest were diagnosed through recent study.*

Our findings suggest that the diagnostic power of chest radiograph is more than sputum smear; however, we think the HSS method for taking sputum wasn't a controlled one. ***(Tanaffos 2003; 2(8): 65-70)***

***Keywords**: Chronic cough, Pulmonary tuberculosis, Sputum-smear*

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INTRODUCTION

Tuberculosis continues to be a major clinical problem in the whole world especially in specific populations. In the last two decades, a marked increase in drug-resistant strains of mycobacterium tuberculosis was seen. Despite of emendation of public health regulations and implementing DOTS globally, tuberculosis control is failing.

Chronic cough, more than 2 weeks duration, is an important symptom in the diagnosis of pulmonary TB. This symptom could be used as a screening index for evaluating the detection and prevalence of TB in community based researches.

In Iran, however, the incidence rate of smear positive pulmonary tuberculosis, miliary form, and tuberculous meningitis (especially in childhood) were decreased, but unfortunately the real incidence and prevalence rate of tuberculosis in our country is still unknown.

In 1999, the prevalence of pulmonary TB was 13.1 (8.73 smear positive and 4.37 smear negative), and based on official census in 1998, the incidence of positive smear pulmonary TB was 8.58 (1).

According to the W.H.O estimated reports, the expected incidence rate of tuberculosis in Iran was 50-90 in 100000 population. This rate was decreased (25-55) after returning a visit to Iran by W.H.O investigators. Finally In 1997, it was estimated that the expected incidence rate of smear-positive pulmonary TB was 25 in 100000 population. (2,3)

"Annual Risk of Tuberculosis Infection" (ARTI) is the most valid index for estimating incidence of disease.

Until 1990, vaccination with BCG was not given countrywide and the ARTI was estimated of 0.5-1%. Nowadays, vaccination with BCG is given routinely; thus, estimation of ARTI is almost impossible. (4,5)

Now we have a query: Is there any significant discrepancy between estimated annual incidence rate of pulmonary tuberculosis with registered and reported data?

Rudsar is a town with a total population of 82658 which is located in Gilan province in the north of Iran.

Since chronic cough is highly suggestive symptom of tuberculosis, (4,6) the aim of this cross-sectional study was to determine the screening value of chronic cough in the diagnosis of TB and to ascertain the prevalence of TB in the population of Rudsar. We also studied and analysed the diagnostic and predictive values of chronic cough and chest x-ray in this research.

MATERIALS AND METHODS

A cross-sectional study was carried out from May 21 to June 20, 1999 among urban population of Rudsar district, which is located in Gilan province, with a total population of 82658 and 19505 families. A total of 19505 families were interviewed. Individuals with more than 2 weeks cough were eligible for this study. Tuberculosis suspects were referred to "District Health Center". For each suspicious case enrolled in the study, diagnostic procedures were performed as following:

- Physical chest examination
- BCG status was ascertained by inspection for typical scars.
- Three sputum specimens were submitted to the laboratory (if participants had productive cough) for direct microscopy examination and Ziehl Neelsen staining as well as the quality of sputum examinations was controlled by NRITLD laboratory in Tehran. The presence of three positive sputum smears confirmed the diagnosis of TB.
- Taking chest radiography was relied on physician judgment.

After performing the above mentioned steps, all diagnosed pulmonary TB cases were registered in the study and referred to public health services for standard treatment.

Data analyses were performed using SPSS 10.01. Z tests were used to compare sputum-smear and radiography with regard to sensitivity, PPV, and NPV. Positive to negative likelihood ratio was used to compare the ability of diagnostic tests.

RESULTS

Of 82658 individuals initially included, 2018(2.37%) (810 female and 1208 male) had a history of more than 2 weeks cough (Fig1).

Of these, 594(29.4%) had a typical scar of BCG. Chronic cough was confirmed in 761 participants (0.9% of total population) by clinical work up. Among them, 403(0.47%) had productive cough, and sputum specimens were taken. Five new smear-positive pulmonary TB cases were diagnosed by using direct microscopy examination (Table1). Results of chest-radiography are indicated in table 2. Radiographic findings were suggestive of pulmonary Tuberculosis in 13 cases, 5 of whom were smear positive pulmonary TB, 3 were smear negative, 3 had old TB lesions, and 2 had no history of PTB.

Sensitivity, specificity, PPV, NPV, and likelihood ratio of smear and radiography are indicated in table3.

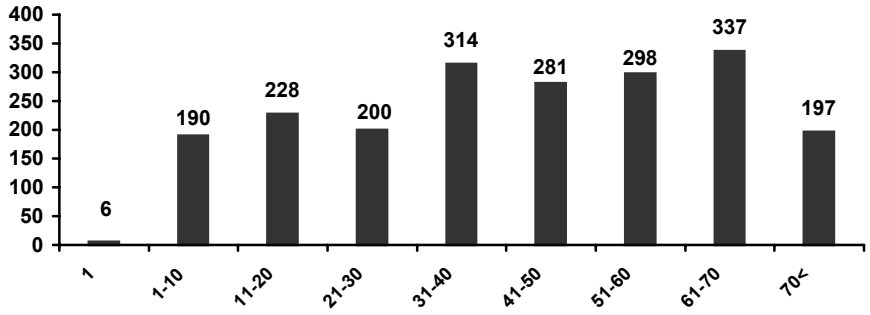

Figure 1. Frequency distribution of chronic cough in different age groups, Rudsar, May 21 to June 20, 1999.

Table 1. Results of sputum-smear direct-microscopy

	Productive cough	First sample			Second sample			Third sample			Incorrect sampling
		Total	Positive	Negative	Total	Positive	Negative	Total	Positive	Negative	
Number of patients	403	343	5	339	316	2	314	279	2	277	59
(%)		(85.1)	(1.5)	(98.5)	(78.5)	(0.63)	(99.37)	(69.23)	(0.72)	(99.29)	(14.64)

Table 2. Radiologic finding of patients with chronic cough (n=78)

Lesion	Number of patients (%)
Compatible with pulmonary Tuberculosis(active/non-active)	13(16.7)
Non-Tuberculosis	11(14.1)
Heart and Valvular Lesion	9(11.5)
Non-specific	3(3.9)
Normal graphy	42(53.8)
Total	78(100)

Table 3. Statistical comparison between smear and chest x-ray

	Sputum-smear	Chest X Ray	p-value
Sensitivity	62.5	100	0
Specificity	100	92.9	0.03
PPV	100	61.5	0
NPV	94.4	100	0.12
Likelihood ratio	23.66	34.26	0

DISCUSSION

Reported incidence of pulmonary TB is lower as compared with the actual incidence of disease in Rudsar during the study. Prevalence of chronic cough was 920 in 100000 population. 343 cases were presented with productive cough, 1.5% of them were smear positive. A similar study indicated 20% of cases with chronic cough were smear positive.

Prevalence of pulmonary TB and smear positive pulmonary TB were 8.5 and 12.1 in 100000 population of Rudsar respectively between March 21 and June 20, 1999. In this study, all of the smear-positive pulmonary TB cases were presented with anorexia and weight loss. Fever, cough (7), and weight loss (8) were reported as the most common symptoms of pulmonary TB in different studies. However, sensitivity of fever and chronic cough for TB diagnosis had failed in some studies (9). Chest x-ray has more diagnostic ability than sputum-smear (10), similar to recent study that found chest-x ray films have more significant value for diagnosis of tuberculosis in comparison with sputum-smear. (specificity; p= 0.03, sensitivity; p=0, NPV; p=0.12, PPV; p=0). However, using radiography for diagnosis of pulmonary TB has some limitations (11). Considering active pulmonary TB, 14% of suspected patients had positive results of chest-radiography (active disease or old TB lesions). Of total tuberculous cases and suspects, active disease was identified in 10% of them by the means of chest-radiography, and 1.45% had positive results of smear examination.

Annual incidence of pulmonary TB and smear-positive pulmonary TB were 47.2 and 30.25 in 100000 population respectively.

Health Service System (H.S.S) identified 2 smear-positive cases between March and June while recent study identified 8 cases with pulmonary tuberculosis in the same time. Thereby H.S.S identified only 20% of patients with tuberculosis.

In our opinion, the only key for diminishing this difference is revising the application of diagnostic tools.

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