FREQUENCY OF SPUTUM POSITIVE AFB CASES AMONG PATIENTS OF PULMONARY TUBERCULOSIS IN TERTIARY CARE HOSPITALS OF NORTHERN PAKISTAN

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Objective: This study was aimed to find out the frequency of sputum positive Acid Fast Bacilli (AFB) cases among pulmonary tuberculosis patients and to determine those patients who are the potential source of transmitting infection. **Methods:** This study was conducted in four medical units of Khyber Teaching Hospital, Peshawar and Chest Unit, Ayub Teaching Hospital, Abbottabad in collaboration with the pathology unit of Khyber Teaching Hospital, Peshawar, and Kohat Institute of Medical Sciences, Kohat. Three specimens of sputum were collected for three consecutive days in the morning and were transported immediately to the laboratory along with full details of the patients. **Results:** Out of two hundred total patients studied, 104 patients (52%) were sputum AFB positive. Among the 104 patients 60 patients (57.4%) were females. Sixty-four (61.52%) individuals were between 20–50 years. Majority of the patients were from poor, deprived and lower social class. Fifty-two (50%) patients had monthly income of less than Rs. 4,000; only 8 patients (7.67%) had monthly income of more than Rs. 12,000). Forty-eight patients <46.12% were house wives, 10 patients (9.61%) were unemployed. Most of the patients were under weight for their age and height. 24 patients (23.06%) were below 42 kg. The maximum (53.84%) number of patients was in weight range of 43–50 kg. **Conclusion:** Sputum AFB positive pulmonary tuberculosis is more in individuals of low socioeconomic group and in females. The patients put their children and family members at risk of tuberculosis infection. For the control of this disease early diagnosis of active disease and their treatment under supervision is important.

Keyword: Sputum, AFB-Positive, Pulmonary tuberculosis, Low socioeconomic group

INTRODUCTION

Tuberculosis has been with us from the beginning of civilisation and it likely will be with us until the end.[1]

It is defined as a disease caused by bacteria belonging to Mycobacterium tuberculosis complex.[2] It can affect any organ of the body but in two third of the cases it involves the lung parenchyma.[2,3] This form of tuberculosis is called pulmonary tuberculosis. Pulmonary tuberculosis may be primary or post primary (secondary) depending upon prior exposure.

Commonly, pulmonary tuberculosis is infectious, transmitted between individuals by droplet infection,[4] with greater spread of infection from patients having sputum smear positive for acid fast bacilli[5,6]. Transmission is also influenced by features of the potential recipient of the organism (contact) especially the immune status, and by the environment in which they live.

Examination of the sputum smear for acid fast bacilli by direct microscopy is by far the most important investigation for the diagnosis of pulmonary tuberculosis.[7] Early detection and effective treatment of smear positive tuberculosis patients has been found to be the most cost effective strategy for the control of the disease.[8]

Among other investigations, culture of sputum for isolation of organism is the only definitive way of making a diagnosis, however it is time consuming and the facility is not widely available. Serological techniques lack reliability and the newly developed molecular techniques, though sensitive and rapid, are expensive and sparsely available in Pakistan, making them impractical for use in most cases.[9]

When anti-tuberculosis drugs were introduced, it was widely assumed that eradication of tuberculosis; one of mankind's most ancient and deadly diseases, was within easy reach. Unfortunately, such optimism was not well founded. Worldwide, the number of tuberculous cases has continued to increase. The disease is thought to cause at least 3 million deaths each year and the annual number of new cases is approximately 9 million.[10] Of these new cases, perhaps 50% of the patients have Mycobacterium tuberculosis identified in sputum smears and the other 50% would have TB proved by isolation of the organism in culture, if facilities for culture were available.[4]

In Pakistan, tuberculosis is a leading cause of morbidity where 80% of the disease is present in persons who are in their reproductive age. Around 1.5 million persons are suffering from active tuberculosis along with more than 0.2 million new cases each year.[11] With the migration of Afghan refugees to Pakistan, especially to NWFP, the problem has worsened. Most of them live in poor

hygienic conditions in camps and are the source of TB among themselves and in the native population.[12]

With proper treatment the disease is curable in virtually all cases caused by drug susceptible strains but without treatment it may kill the patient within five years, in more than half of the cases.[2]

The development of multi-drug-resistant (MDR) tuberculosis has emerged as a public health concern in Pakistan in the last decade. Lack of public awareness, easy availability of the anti-tuberculosis drugs, poverty, no proper follow up, relatively complex and prolonged treatment regimen are all potential sources for default, treatment failure and development of MDR tuberculosis. National tuberculosis programme, if managed in accordance with WHO's recommendations, will help in combating MDR tuberculosis.

In a developing country like ours where poverty, illiteracy, overcrowding, poor hygienic conditions, social deprivation and lack of proper medical care is present, presence of persons who are coughing up tuberculous bacilli is forming a chain of transmission of infection and identification of smear positive cases is a major detrimental factor in finding or predicting the magnitude of disease, and by their effective treatment the spread of mycobacterium tuberculosis will be prevented, which is the basis of anti-tuberculosis campaign in a developing country.

MATERIAL AND METHODS

This study was conducted in four medical units of Khyber Teaching Hospital Peshawar and Chest Unit of Ayub Teaching Hospital, Abbottabad in collaboration with the Pathology Department, Khyber and Ayub Teaching Hospitals. The study period was from Jun 2005 to Dec 2006. Two hundred patients were included in the study.

All patients with age of 16 years and above, patients having clinical features suggestive of pulmonary tuberculosis as evening pyrexia, weight loss, productive cough, haemoptysis, night sweats, malaise, tiredness, anorexia, chest pain, and patients with raised ESR and X-ray chest finding suggestive of pulmonary tuberculosis like abnormal shadows, cavitation, and/or abnormality in the lymph nodes were included.

Patients having tuberculosis other than pulmonary, diagnosed case of malignancy and a diagnosed case of HIV were excluded.

A thorough clinical assessment was carried out after admission with emphasis on clinical history, physical examination, and necessary investigations. A printed proforma containing a comprehensive record of all patients was completed from each patient. Blood complete picture with ESR, Urine R/E, Chest X-ray, Blood Urea, Blood Sugar, and Sputum smear examination by direct microscopy after Ziehl Neelsen staining were done for all patients.

A wide mouthed, leak proof, clean bottle was given to each patient on day of admission and were advised to collect sputum as soon as he/she wakes up in the morning. Patients were instructed to collect at least 3–5 ml of sputum by coughing vigorously after deep inspiration, repeatedly if necessary. This produces sputum specimen from deep in the lungs. The specimen was transported immediately to the laboratory, along with a request form, having full details, written on it about the patient. Sputum was sent on 3 consecutive days. Sputum smears were prepared by selecting the solid or most dense particles of sputum and smearing it on a microscopy slide using a wire loop. The slide then dried, fixed and was stained with Ziehl Neelsen Carbol Fuchsin. Slides were examined with 100× oil immersion and 100 fields were examined before the smear was reported as negative.

RESULTS

Out of a total 200 patients, 104 patients (52%) were sputum AFB positive (Table-1). Among these 104 cases, 60 patients (57.4%) were females. Sixty-four individuals (61.52%) were between 20–50 years of age (Table-2). Majority of the patients were members of poor, deprived and lower local class.

Fifty-two patients (50%) had monthly income of less than Rs: 400 only, 8 patients (7.67%) had monthly income of more than Rs. 12,000; 48 patients (46.12%) were housewives, and 10 patients (9.61%) were unemployed (Table-3). Most of the patients were under weight for their age and height; 24 patients (23.06%) were below 42 kg. The maximum (53.84%) number of patients was in weight range 43–50 kg. (Table-4). The chief presenting symptoms were evening pyrexia (90.38%), productive cough (84.61%), and weight loss (53.84%). Chest pain (5.76%) and anorexia (7.69%) were less common symptoms, (Table-5). Common signs at presentation were anaemia, i.e., 78 patients (75%) were anaemia, 16 patients (15.38%) had bronchial breathing, 30 patients (28.84%) had cracles and 3 patients (5.76%) had ronchi, (Table-6). During investigation most of the patients especially female were having Hb level of 8–10 gm/dl (40.38%). Total leucocyte count was in normal range. High ESR was observed in many patients. Only 14 patients (13.46%) had an ESR of <20 mm/1st hour (Table-7). Common X-ray (chest) features were unilateral upper lung field involvement seen in 24 patients (46.15%), (Table-8).

Table-1: Patients with sputum AFB positive result out of 200 patients studied

Sputum smear result	Number	%
AFB positive	104	52.0
AFB negative	96	48.0

Table-2: Age distribution of 104 sputum AFB positive patients

Age (years)	Number	%age
16–25	16	15.38
26–50	64	61.53
51 and above	24	23.07

Table-3: Occupational status of 104 sputum AFB positive

Occupation	Number	%
House wife	48	46.15
Labourer	24	23.07
Government servant	6	5.76
School teacher	6	5.76
Shop keeper	4	3.84
Student	4	3.84
Tailor	2	1.92
Unemployed	10	9.61

Table-4: Weight distribution of 104 sputum AFB positive patients

Weight (kg)	Number	%
<40	24	23.07
41–50	56	53.84
51–60	18	17.30
>61	6	5.76

Table-5: Symptoms at presentation in 104 sputum AFB positive patients

Symptoms	Number	%
Evening pyrexia	94	90.38
Tiredness	46	44.23
Malaise	52	50
Weight loss	56	50
Night sweats	34	53.84
Productive cough	88	84.61
Haemoptysis	28	26.92
Anorexia	8	7.69
Chest pain	6	5.76
Palpitations	16	15.38

Table 6: Signs at presentation in 104 sputum AFB positive patients

Sings	Number	%age
Temperature 98.4°F	12	11.53
100 °F	82	78.84
101 °F	4	3.84
102 °F	4	3.84
> 102 °F	2	1.92
Anaemia	78	75
Bronchial breathing	16	15.38
Crackles	30	28.84
Ronchi	6	5.76

Table-7: ESR of 104 sputum AFB positive patients

ESR (mm/1st hour)	Number	%
<20	14	13.46
20–60	34	32.69
60–100	14	13.46
>100	42	40.38

Table-8: Chest radiological pattern in 104 sputum AFB positive patients

X- ray pattern	Number	%
Unilateral upper lung field	48	46.15
Bilateral upper lung fields	22	21.15
Cavitary disease	26	25
Diffuse pulmonary TB	2	1.92
Lower lung field	6	5.76

DISCUSSION

Tuberculosis has caused more deaths than any other infectious disease and 95% of these deaths are in the developing world.[12] It is the fourth major cause of death in Pakistan. Early diagnosis and effective treatment of active cases particularly pulmonary who are infectious to the community is the best way of controlling TB in our country. The delay in diagnosis and inability to cure a high proportion of pulmonary smear positive cases are the main reasons of increased risk of infection, high death rate and MDR cases in Pakistan.

Currently for diagnosis, developing countries rely on AFB stains and culture (where available) and radiographic changes. ZN-staining is a rapid, simple and cheap way of diagnosing pulmonary tuberculosis but it lacks sensitivity, still it is the most rewarding method if performed by an experienced microbiologist.

In this study, 104 out of 200 patients (52%) were sputum AFB positive. Though the validity of the AFB positivity on sputum specimens may be questioned, because they were not confirmed by culture for AFB, this was thought not be the case as patients with the possible diagnosis of tuberculosis only on clinical, laboratory and radiological grounds were included in the study.

In another study by Asch S and colleagues (Los Angeles 1998)[13], 56% patients had positive sputum AFB results. This study was done on homeless patients and the increased frequency as compared to my study could be because of the selection of high-risk patients.

Of the 104 patients, 60 patients (57.6%) were females and 44 patients (43.30%) were males that match with the sex distribution of TB patients noted by Akhtar T and colleagues (1994)[8] and Ahmed M and colleagues[14]. These findings are in agreement with earlier findings that tendency to disease and mortality from TB is higher in females as compared to males.[15] Females from illiterate families in general are treated lower than men and so have a poor nutritional status. In addition, early marriages and multiple pregnancies put extra burden on the defence leaving them more vulnerable to develop TB. TB in women puts their children and family members at risk of tuberculosis infection, disease and death.

This triple threat makes detection and treatment of TB in a woman absolutely vital.

As compared to a developed country, where TB is common among elderly, it is a disease of young in a developing country. Seventy five percent (75%) of tuberculosis cases occur in age group of 15–59 years[16], the most economically productive sector of society. It was true in this study, as 61.52% of patients were in the age group of 20–50 years and 15.38% of patients were in the age group of 16–25 years.

The monthly income of 50% of patients was below Rs. 4,000, and only 7.6% had more than Rs. 10,000. Similarly in a study by Iqbal ZH and colleages[17], majority of tuberculous patients were from lower socioeconomic group. As regard occupation, 46.15% were housewives, and 9.61% of patients were unemployed. Poverty, unemployment and homelessness are all linked and increases the risk of developing TB.[18]

The commonest symptom at presentation of which 90.38% of patients complained was of evening pyrexia. Another common symptom was productive cough; present in 84.61% of patients; Phuc LT and colleagues[19] reported similar results.

Weight loss was the presenting symptom in 53.84% of patients, tiredness in 44.23% of patients, and malaise in 50% of patients. It is said that in pulmonary TB the frequency of weight loss and malaise are less common and very difficult to quantify.[4] The difference may be because of the setup to which the patients belong, as many of the patients in my study were under weight and malnourished

Night sweats was noticed in 32.69% of the patients, although it has been described as a classic symptom of pulmonary TB[4], Kumar and Clark[20] described drenching night sweats as a less common feature and attributed it to the anxiety associated with the disease. The reason for night sweats in my patients was high grade fever in some patients and anxiety in others.

Haemoptysis was the presentation in 26.92% of patients. About 75% of patients were clinically anaemic. It is said that nutritional status of patients with active pulmonary TB is poor as compared to the healthy subjects. This could be one of the reasons for anaemia, similarly haemoptysis and anaemia of chronic disease could be the additional factors responsible.

Examination of the chest revealed no positive findings, except that on auscultation 15.38% of the patients had bronchial breathing, 28.84% of patients had crackles and only 5.76% of patients had ronchi. In general, the examination of chest contributes relatively little to the diagnosis or assessment of post-primary TB.[21]

Low haemoglobin of 10–12 gm/dl was reported in 51.92% of patients, 40.38% of patients had Hb levels of 8–10 gm/dl. In many patients, total leukocyte count was within normal range. Hafiz S[22] described low haemoglobin, normal or high TLC and raised ESR as the haematological findings in tuberculosis patients. ESR was elevated in majority of patients; only 13.46% of patients had an ESR of less than 20 mm/1st hour.

On chest x-ray examination, the commonest presentation was typical pattern of upper lung field infiltrates and or nodules with or without cavitation seen in 47 patients (90.38%). Wilcke JT *et al*[23] reported typical presentation in 92% of patients. Of the typical pattern, unilateral upper lung field involvement was noticed in 46.15% of patients, 21.15% had bilateral upper lung field involvement, while 25% of patients had cavitary disease. In an earlier study[24], unilateral lung field involvement was seen in 37.89% of patients, bilateral upper field involvement in 62.2% of patients and cavitary disease in 39.6% of patients. Lower lung field tuberculosis (with lesion confined to area below the hilum) was noticed in 5.76% of patients.

CONCLUSIONS

Sputum AFB positive pulmonary TB is more in females, in young age individuals, and in people of low socio economic group.

For the control of tuberculosis, early diagnosis of active cases and their treatment under supervision is important.

Acid fast staining of sputum is the best method, if performed by experienced microbiologist, as it is reliable and economical. Its diagnostic yield can be increased by liquefaction and centrifugation of sputum and by examining more than one sample.

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