ORIGINAL ARTICLE

Drug Resistance Pattern in Pulmonary Tuberculosis Patients Coming to Pulmonology Ward BVH Bahawalpur

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ABSTRACT

Aim: To determine the frequency of drug resistance pattern of mycobacterium tuberculosis (MTB) among pulmonary tuberculosis patients coming to Pulmonology Department BVH Bahawalpur.

Methods: This descriptive cross sectional study was conducted in Department of pulmonology, Bahawal Victoria Hospital, Bahawalpur from October 2015 to April 2016. All required tests were carried out in Department of Pathology, Quaid-e-Azam medical college, Bahawalpur.

Results: Mean age of the patients was 46.71±12.25 years. Male patients were 170(66.40%) and female patients were 86(33.59%). Total 50(19.53%) patients were found with drug resistance and 206(80.43%) patient sensitive to anti TB drugs. No significant association of gender and age with drug resistance was found.

Conclusion: In the present study the most common pattern observed is TB with predominant resistance to INH. No significant association was of gender and age with drug resistance was observed.

Keywords: Tuberculosis; resistance patterns; susceptibility tests; multidrug resistance

INTRODUCTION

Tuberculosis (TB) is an ancient disease which is playing havoc with human health and economy for a long time. TB remains a leading cause of morbidity and mortality despite all global efforts[1]. TB affects 10 million new cases every year and about 3 million die due to this disease all over the world[2]. Developing Countries bear more than 90% of TB disease burden[1,2]. In Eastern Mediterranean Region (EMR) of WHO, 43% of TB cases reside in Pakistan[1,2]. Pakistan is ranked 6th among 22 high TB burden countries[1,2]. Annual death rate due to TB is 39 per 100000 in Pakistan[3,4].

Drug resistance in tuberculosis is an issue of great concern throughout the world[5]. Drug resistant TB has higher mortality rates as compared to drug sensitive TB[6]. Drug resistant TB poses great challenge in terms of treatment for program managers[7]. Incidence of MDR-TB (Mycobacterium tuberculosis resistant to at least Isoniazid and Rifampicin) in Pakistan in new and previously treated cases is 3.4% and 36% respectively according to WHO reports[8]. Epidemiological studies are necessary to optimize drug therapy and to prevent spread of resistant strains in a specified area[9]. There are small studies on drug resistance pattern from Pakistan specially southern Punjab[7]. A study conducted in Lahore showed that most of the patients of drug resistant TB have resistance to both Isoniazid and

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Rifampicin (17%) and 25.9% patients were resistant to Rifampicin alone[10]. This study is performed to determine the drug resistance pattern in tuberculosis patients in Bahawalpur as number of drug resistant cases reporting is on the increase in Pakistan[8]. Determining the frequency and pattern of drug resistance in this region will prove very helpful in estimating and treating the growing threat of drug resistant TB. It will also help to compare frequency of drug resistant cases in this area with frequency of resistant cases in overall Pakistan[8].

MATERIAL AND METHODS

This descriptive cross sectional study was conducted in Department of pulmonology, Bahawal Victoria Hospital, Bahawalpur from October 2015 to April 2016. All required tests were carried out in Department of Pathology, Quaid-e-Azam medical college, Bahawalpur. Permission was taken from Ethical Review Committee before starting the study and written informed consent was taken from all the selected patients. Total 256 male and female patients aged 18-60 years having diagnosis of category I pulmonary tuberculosis (patients having one sputum sample positive for AFB) were recruited for the study.

A person whose sputum smear examination positive for acid-fast bacilli was labelled as Pulmonary TB case. Mycobacterium (MTB) is cultured by 1% proportion method on Lowenstein-Jensen (LJ) medium. MTB growth is checked after introduction of anti-tuberculosis drugs (Isoniazid, Rifampicin, Ethambutol, Pyrazinamide and

Streptomycin) into culture media. If MTB growth is not halted after introduction of any of these drugs, then MTB is considered resistant to that particular drug. A patient of pulmonary tuberculosis who has never taken ATT or has taken ATT less than 1 month was labelled as category 1 case of TB[11].

All patients who were receiving ATT currently, patients with extra-pulmonary TB, and those who cannot expectorate, patient suffering from severe systemic illness (i.e. sepsis, malignancy, trauma), unconscious, unable to spontaneously clear the airways or with other medical condition requiring immediate tracheal intubation and hemodynamically unstable patients were excluded from the study.

Demographic data of the patients was entered on a predesigned Performa. Early morning fasting sputum sample (at least 2ml) of all participants were collected in a sterile container. It was promptly transported to Microbiology section of Pathology department QAMC. Samples were refrigerated in laboratory till processing. All samples were subjected to culture and drug sensitivity testing by 1% proportion method on Lowenstein-Jensen (LJ) medium for 6 weeks by the same consultant microbiologist. Findings of the laboratory were entered on pre-designed proforma.

All the collected data was entered in SPSS version 17 and analyzed. Mean and SD was calculated for age and frequencies were calculated for categorical variables. P value ≤5% was considered as statistically significant.

RESULTS

Total 256 patients with pulmonary tuberculosis were included. Mean age of the patients was 46.71±12.25 years. Total 50(19.53%) patients were found with MTB and 206(80.47%) patients without MTB (Fig. 1).

Among the patients of pulmonary tuberculosis, drug resistance was found in 50 (19.53%) patients followed by 22(8.59%) patients were resistant to Isoniazid and 14(5.47%) patients resistant to Rifampicin, 10(3.91%) patients resistant to Ethambutol, 4(1.56%) patients resistant to Pyrazinamide and no patient resistant to Streptomycin (Table 1).

All the 256 patients of pulmonary tuberculosis were divided into two age groups age group 18-40 years and age group 41-60 years. Total 64(25%) patients belonged to age group 18-40 years and MTB was found in 16(25%) patients and 192(75%) belonged to age group 41-60 years and MTB was found in 34(17.71%). No significant association was seen between the age of the patients and MTB (P value 0.207) (Table 2).

After the gender distribution of the patient, among the 170(66.40%) male patients with pulmonary tuberculosis MTB was observed in 34(20%) patients and among the 86(33.59%) female patients with pulmonary tuberculosis, MTB was seen in 16(18.6%) patients. Insignificant association was seen between gender and MTB (P value 0.868) (Table 3).
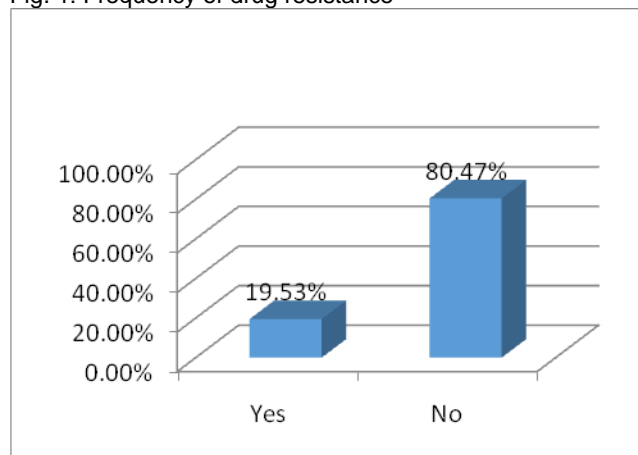
Fig. 1: Frequency of drug resistance

Table 1: Drug resistance pattern

Status	Frequency	%age
Drug Sensitive	206	80.47
Drug resistance	*50*	*19.53*
Isoniazid	22	8.59
Rifampicin	14	5.47
Ethambutol	10	3.91
Pyrazinamide	4	1.56
Streptomycin	0	0

Table 2: Age distribution of the patients.

Age group	Drug resistance		Total
	Yes	No	
18-40	16(25%)	48(75%)	64(25%)
41-60	34(17.71%)	158(82.29%)	192(75%)
Total	50(19.53%)	206(80.47%)	256

P value 0.207

Table 3: Gender distribution of the patients

Gender	Drug resistance		Total
	Yes	No	
Male	34(20%)	136(80%	170(66.40%
Female	16(18.6%)	70(81.4%)	86(33.59%)
Total	50(19.53%)	206(80.47%)	256

P value 0.868

DISCUSSION

To estimate the drug resistance of MTB, it is extremely important to evaluate the epidemiology and control of tuberculosis. Like many developing countries, in Pakistan, drug resistant tuberculosis is increasing and is a significant threat to tuberculosis control because there are few drugs effective against TB[9].

Pakistan ranks sixth among the list of 22 high TB burden countries with a TB related death rate of 43/100,000 population annually. Resistance to TB drugs has been widely reported from various parts of the country[8,9,14-19], however, pertinent community based data that represents a national profile is lacking[10,11]. In the absence of community data, hospital based studies provide indication of the levels of drug resistance and particularly of resistance trends over the years. Our study showing an overall resistance rate of 19.53% to the anti-tuberculosis drugs. Githui et al[12] and Lee et al[13] reported in their studies drug resistance rate as 18.3% and 18.7% which is comparable with our study. Ndung'u et al[14] found TB drug resistance in 30.1% cases which is higher than our findings.

In present study there was a greater number (66.40%) of males was found with pulmonary TB than females (33.59%) and insignificant (P=0.868) association was seen between drug resistance and gender. This differs with earlier studies in Kenya where more females were associated with drug resistance than males (P=0.008)[12]. Our findings also in contrast with studies in Pakistan, where drug resistance was associated with 70.9% males and 29.15% females, and also in Tanzania, where drug resistance was associated with 68% males and 32% females. Globally a 70% predominance of males over female patients was reported[15,16]. The WHO reported that 67.2% of the global male population was diagnosed with TB as compared to the female population.[17] The greater number of males compared to females could be attributed to behavioral factors such as smoking, which is a predisposing factor to TB with more males being smokers than females. Alcohol consumption, malnutrition and the delay in seeking medical treatment, especially by men, are other factors that have been associated with higher numbers of males than females with TB, with over 66.40% of the participants in the current study being male[18,19].

In our study the drug resistance rates for individual drugs; Isoniazid, Rifampicin, Ethambutol, Pyrazinamide and Streptomycin were 8.59%, 5.47%, 3.91%, 1.56% and 0% respectively. The highest drug resistance rate was observed for Isoniazid. These results are comparable with one study by Ndung'u et al[14].

In one study by Hussin et al[20] resistance rates for individual drugs were 27%, 11%, 0%, 14.5% and 13% for INH, RIF, PYR, ETH, STREP respectively. Rasul et al[21] reported individual drug resistance as 25%, 25%, 24%, 10% and 21% for INH, RIF, PYR, ETH, STREP respectively. Haq et al[22] reported the overall drug resistance was noted among the 36% patients out of 100 patients with individual drug resistance for INH, RIF, PYR,ETH, STREP as 25%, 15%, 0%, 12% and 19% respectively. Iqbal et al[7] reported overall TB drug resistance as 53% and note resistance for INH, RIF, PYR, ETH, STREP as 26%, 28%, 29%, 15% and 24% respectively.

Resistance to INH in this study was 8.59%, which was in agreement with results obtained in earlier studies in Kenya[12] where resistance to INH was 10.2%. INH resistance in the present study was higher than earlier study in Ethiopia and Bangladesh.[23-24]

CONCLUSION

In the present study the most common pattern observed is TB with predominant resistance to INH. No significant association was of gender and age with drug resistance was observed. There is a rise in the number of drug resistant tuberculosis cases, especially MDR. Hence close monitoring of drug resistant pattern is required to formulate designs of different regimens in the treatment of drug resistant tuberculosis; especially MDR-TB based on accredited laboratory reports, in a specialized center which is very much essential for the betterment of the patients and the community.

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