Original Article

DETERMINING THE DEMOGRAPHIC PATTERNS OF DRUG-RESISTANT AND DRUG-SUSCEPTIBLE TUBERCULOSIS IN LARKANA, RESISTANT AND DRUG-SUSCEPTIBLE TUBERCULOSIS IN LARKANA, PAKISTAN THROUGH A RETROSPECTIVE SURVEYPAKISTAN THROUGH A RETROSPECTIVE SURVEY

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ABSTRACT

Objective: To determine the effects of Tai Chi exercises on physical activity, pulmonary function, and rate of perceived exer-tion in post-coronary artery bypass grafting patients.

Objectives: The objective of this research was to find out the demographic characteristics of drug-susceptible and drug-re-sistant Tuberculosis in Larkana, Pakistan.

Material and Methods: A retrospective survey was conducted on data from the TB Control Program Larkana recorded between 1st January 2021 to 3rd June 2022. 7 sentinel sites and 5 Programmatic Management of Drug-resistant Tuberculosis sites report the data to the TB control program. The data was entered into Excel and analyzed through frequency tables, histograms, and bar charts.

Results: A total of 39,210 Tuberculosis cases were reported to TB control program LARKANA from 1st January 2021 to 3rd June 2022; 38,723 were drug-susceptible while 487 were drug-resistant TB cases. The highest percentage of TB was found in the age group 15-24 years. Males were more affected than females with drug-susceptible TB. In contrast, drug-resistant TB was affecting females more than males. 58% of cases were reported in the public sector while 42% cases in the private sector. The households of only 2,412 (6.22%) patients of drug-susceptible Tuberculosis were screened out of 38,723 patients. In 2815 Tuberculosis patients screened for HIV, 4 drug-susceptible and 5 drug-resistant cases were positive for HIV. 8.41% of drug-resistant TB patients were diabetic

Conclusion: The frequency of TB cases is high in Larkana, especially among 15-24-year-olds. Household contact screening is inadequate in Larkana. There is a high percentage of coexisting drug-resistant TB and diabetes.

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INTRODUCTION

Tuberculosis TB is an infectious disease caused by different species of mycobacterium, the most common being Mycobacterium Tuberculosis. 1 It infects all organs of the body but primarily the lungs known as pulmonary TB. 2 TB is classified into latent TB and active TB. Latent TB is non-contagious while people with active TB spread the infection through air-borne droplets.3 Pulmonary TB is a serious health concern as it is more common than ex-tra-pulmonary TB.4When the standard first-line anti-TB drugs; isonia-zid INH, rifampin RIF, ethambutol EMB, and pyrazinamide PZA, are effective and completely cure the infection it is known as drug susceptible to TB DS TB. When the bac-teria do not respond to the standard anti-TB treatment it is referred to as drug-resistant TB DR TB. 5 The glob-al prevalence of DR TB is reported to be 11.6% which is quite high.6 Further classification of DR TB

includes mul-tidrug-resistant TB being resistant to both isoniazid and rifampicin, the two most effective first-line TB drugs, and extensively drug-resistant TB is resistant to any fluoro-quinolone, and at least one of three second-line injectable drugs capreomycin, kanamycin, and amikacin, in addition to multidrug resistance.

Despite all the work done to curb TB, its prevalence remains high. Although TB cases are reported in almost every part of the world, 87 % of the new cases are reported in the 30 high-burden countries including Pakitan, Bangladesh, India, China, and Nigeria. The number of people getting infected with multi-drug resistant TB is also on the rise.

Pakistan ranks fifth among high-burden countries for TB. An estimated 510000 new TB cases emerge an-nually, out of which 15000 are Drug-resistant cases. The country contributes to 61% of all the cases of TB in the WHO eastern Mediterranean region. Pakistan has the 4th highest prevalence of drug-resistant TB. 7

TB is not limited to specific age groups or gender. However, people with immune-compromised states, including HIV and Diabe-tes, are predisposed to active TB. The coexistence of TB and HIV is variable in different geographical locations. In Asian countries, it is around 17%. TB is the leading cause of death in HIV-positive patients.8 According to WHO guidelines, screening of HIV in TB patients and TB in HIV patients is recommended to tackle the co-existence of this deadly combo.9Diabetes is not an established co-morbidity of TB but the geographical distribution of TB burden and bur-den of diabetes coincide. Diabetes increases the risk of active TB. 10, 11, 12. Changing lifestyles due to increased ur-banization have resulted in a rising incidence of diabetes in developing countries. 13 Studies have shown that diabe-tes lowers the immunity of the body which could increase the chance of active TB. 10 The literature on emerging drug resistance, its co-infection with HIV, diabetes, and close contact transmission is lacking, which makes it difficult to eradicate TB in developing countries. Our study will help the policymakers to identify the most affected population and hence modify the measures taken to eradicate TB. The objective of this research was to find out the demographic characteristics of drug-susceptible and -re-sistant TB in LARKANA, Pakistan. We further aimed to find out the frequency of diabetes among drug-resistant TB cases and to determine the frequency of HIV in TB patients.

MATERIAL AND METHODS

This retrospective descriptive study was conduct-ed on data from the TB Control Program Larkana recorded between 1st January 2021 to 3rd June 2022. The sample size was 39,210 including both drug-susceptible and drug-resistant TB cases. The TB cases reported to the seven TB/HIV sentinel sites and five Programmatic Management of drug-resistant TB PMDT sites were included. A total of 99 TB patients were excluded, out of which 69 patients were those whose treatment failed, 26 patients were those who were not able to follow up their treatment and 4 other patients were excluded due to their death during the study. The data of the following variables was collected: age, gender, number of patients presenting to private practices and government-funded public hospitals, type of TB drug-susceptible and drug-resistant, immunodeficiency virus HIV, diabetes, and contact screening of households. Diabetes in drug-susceptible cases could not be evaluated as there was insufficient data in the records of the TB control program LARKANA. The data was transferred into Excel and it was presented in the form of frequency tables, his-tograms, and bar charts. The categorical variables were reported as numbers and percentages.

RESULTS

A total of 39210 TB cases were reported to the TB control program through 7 sentinel sites and 5 PMDT sites. Out of 39210 TB cases, 38723 98.75% were drug-suscep-tible while 487 1.24% were drug-resistant. In drug-susceptible TB cases, males were more affected than females with a male-to-female ratio of 1.13 Fig 1. In drug-resistant TB cases, females had a higher frequency having a male-to-female ratio of 0.831. The age group 15-24 years had the highest prevalence of both drug-susceptible and drug-resistant TB. Although cases of drug-susceptible TB were high in the 0-4 age group, no cases of drug-resistant TB were reported in this age group Fig 2.The household contacts of only 2412 (6.22%) patients of drug-susceptible TB were screened out of 38723 patients, while 36311 (93.7%) drug-susceptible TB patients' household contacts did not undergo screening. The total household contacts of the 2412 TB patients came out to be 8558. Out of these, only 6550 (76.53%) were screened for TB. 90 household contacts were diagnosed with TB and only 14 were put on preventive treatment. A total of 2815 patients were screened for HIV. Only 4 cases in the drug-susceptible group and 5 in the drug-resistant group 1.02% were positive. All the drug-re-sistant cases were screened for diabetes. 446 cases showed a negative result while 41 (8.41%) patients were diabetic.

DISCUSSION

This survey was conducted to determine gen-der-wise and age-wise distribution and male-to-female ratio of drug-resistant and drug-susceptible TB. The frequency of the coexistence of Diabetes and HIV in the diagnosed TB population of Larkana, Pakistan was also determined. Data collected for the survey showed that TB was most prevalent in the age group of 15-24 years- 18.76 % of drug-susceptible and 29.77% of drug-resistant TB. This is in accordance with the research conducted in Pakistan.

Table 1: Sentinel and PMDT sites

| SENTINEL SITES	PMDT SITES
Lady Reading Hospital, Peshawar	Lady Reading Hospital, Peshawar
Hayatabad Medical Complex, Peshawar	Ayub Teaching Hospital, Abbottabad
District Head Quarter Batkhela, Malakand	Mufti Mehmood Memorial Teaching Hospital, D.I Khan
District Head Quarter, Abbottabad	Mardan Medical Complex, Mardan
District Head Quarter, Bannu	Programmatic Management of drug-resistant TB PMDT Swat Saidu Group of Teaching Hospital, SGTH
District Head Quarter, Kohat	
District Head Quarter, D.I Khan	
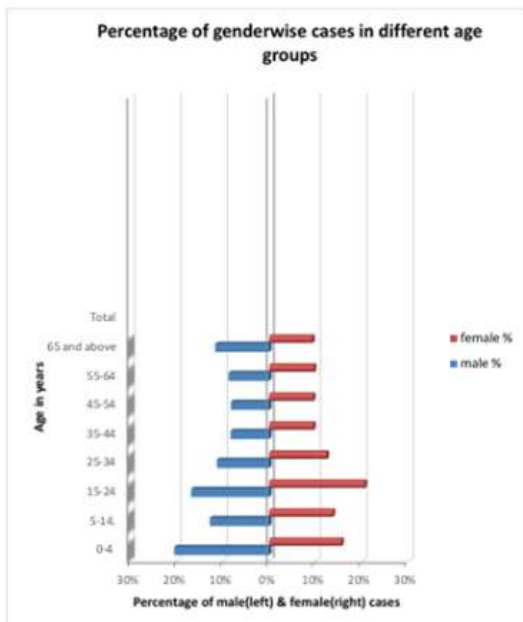
Fig 1: Age-sex distribution of Drug-Susceptible TB case

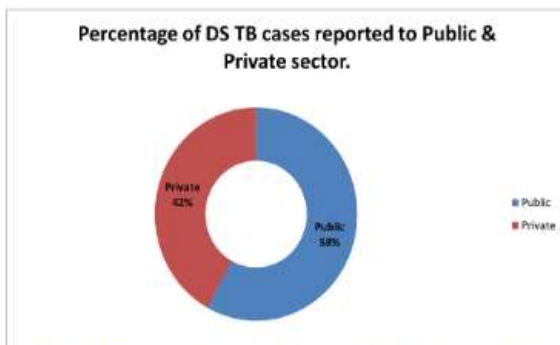**Fig 2: Frequency of DS and DR cases by age group**

Fig 3: Percentage of drug-susceptible TB cases reported to the public and private sector hospitals

In Sana Sharif et al. 25% of TB cases were reported in the age group of 10-20 years in Multan 14. In a research based on TB in Lower Dir, a high incidence of 28.1 % was observed in the age group of 1-20 years7. This age group is usually affected because of its greater exposure to potential suspects in the outside environment and ignorance of symptoms on appearance. The data also showed that the rate of drug-susceptible TB was very high among young children aged from 0-4 years 18.312%; mainly due to malnutrition and frequent social contact of this age group with its family members

It is widely reported that TB is more prevalent in males than females. In our findings, the trends of drug-susceptible TB in LARKANA coincide with global trends. 16 However, the results of drug-resistant TB are contrary. Drug-susceptible TB is more frequent in males with a male-to-female ratio of 1.13, but in drug-resistant TB male-to-female ratio is 0.831. This figure is comparable to many studies con-ducted in LARKANA which have shown that the number of fe-males suffering from TB is more than males. 17,18,19 Many factors including poor nutritional status, low immunity, and poor drug compliance could be contributing to this high frequency of drug-resistant TB in the female population.

TB is a contagious disease so people living together, especially exposed to patients with high-grade sputum smears, are at greater risk of getting the disease.20 It is estimated that on average 10 to 15 people can contract TB from a single TB patient over one year. 21 Contact screening is an important measure in preventing the transmission of TB. Research conducted in Cambodia showed that intensive screening of contacts for 2 years made a notice-able reduction in TB cases although contact screening has been added to the management program of TB in Pakistan its adequacy is not reflected by our data i.e., only 2412 out of 38723 0.06% drug-susceptible TB patients' households were screened. According to the TB control program LARKANA, difficulty in accessing contact screening, lack of awareness about the spread of TB, and financial problems are a few reasons that result in inadequate contact screening. Out of 38624 drug-sensitive TB patients, 58% were reported to the public sector and 42% to the private sector. This points out that the private sector plays as crucial a roles the public sector in the diagnosis and treatment of TB patients. Public-private mix model ppm was piloted in specific areas in Pakistan in 2004. After a decade, WHO re-ported that Pakistan was still contributing to 7% of the gap between the reported cases and the estimated incidence of TB globally, and a revised ppm was implemented. 23TB and HIV are observed to display destructive synergy, TB being one of the main causes of death in HIV patients. According to WHO, 8.2% of TB patients were also suffering from HIV in 2019 24. Despite this high percentage, our data showed that the co-infection of TB and HIV was meager in LARKANA with only 4 out of 2328 drug-susceptible and 5 out of 487 drug-resistant TB patients having a co-infection with HIV. Diabetes is known to

increase the risk of active TB, especially in countries like Pakistan where the burden of both TB and Diabetes is very high.10, 11, 12 Only drug-resistant TB cases were screened for diabetes and 41 out of 487 patients 8.41% were found positive. These results agree with previous studies conducted in Pakistan. 25,26Diabetes could be a risk factor for drug-resistant TB as TB patients with coexistent diabetes do not show a good response to anti-TB drugs. 27,28The limitations of this study were that data obtained from the TB control program, LARKANA was not available for diabetes in drug-susceptible TB. Not all TB cases were screened for household contact and it could not be con-firmed if people acquired TB specifically from household contact or through any other source.

CONCLUSION

The findings of this study show that the frequency of TB cases is high in LARKANA, especially among the age group of 15-24. Household contact screening is inadequate in LARKANA, although it could be an effective way to diagnose TB in the early stages. There is only a slight difference between the total number of cases reported to private and public sector hospitals implying that both play a crucial role in the diagnosis of TB. There is a high percent-age of coexisting drug-resistant TB and diabetes. Hence in patients suffering from both ailments simultaneously, procurement of successful TB treatment could warrant diabetes treatment as well. Unlike most other high-burden TB countries, HIV-positive TB cases were only meager, hence HIV could not be a risk factor for TB in LARKANA.

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Authors Contribution	
Saif Imdad ,	Conception of study design, acquisition, analysis, and interpretation of data.
Shahjehan Khan	Drafting and methodology, data interpretation
Muneer Ahmed	Analysis and interpretation of data for work & Data Collection