ORIGINAL ARTICLE

DEMOGRAPHICS AND SOCIO-ECONOMIC CHARACTERISTICS OF PATIENTS WITH DRUG-RESISTANT TUBERCULOSIS IN KARACHI

Anika Iqbal[1], Fizza Farooqui[1], Aqsa Abdul Majeed[2], Raafia Aijaz[2]

[1]Sindh Infectious Disease Hospital and Research Center, Karachi Pakistan
[2]The Indus Hospital Research Center, Karachi Pakistan

ABSTRACT

Background: The emergence of drug resistance to TB has overburdened TB-related health issues, especially in low-income settings. Several demographic and socioeconomic factors influence compliance and other causes of the emergence of drug resistance in the TB population. Access to care is hindered by several factors which need investigation to be highlighted for resolution. This study was undertaken to assess the demographic and socioeconomic factors of patients with drug-resistant tuberculosis in Sindh, Pakistan

Material and Methods: This Cross-sectional study was conducted at The Indus Hospital, Karachi for six months. Data on patient demographics, e.g., age, gender, BMI, socioeconomic conditions, e.g., salary, number of people and rooms in the house, literacy level, etc. and type of TB (MDR, pre-XDR, or XDR) was entered onto a pro forma and analyzed using SPSS version 24.0. Frequencies were calculated and reported in results as percentages.

Results: A total of 118 patients were enrolled in the study, of which 84% had MDR TB. Most patients were female (51.7%), and the median age was 31.5 years. The median salary was PKR 17,500 (USD 98.5), the illiterate population (having education less than the primary level) was 42.4%, and most people lived in houses with two rooms, with a median of 7 people in one place.

Conclusion: Since it was seen that MDR TB was more often associated with people having low income, overcrowding, and higher illiteracy rates, it was felt that it is needed to increase the awareness of the target population towards the importance of TB treatment and compliance, and also possibly to encourage having small families to avoid overcrowding and consequently reduce the vulnerability of patients towards MDR TB.

Keywords: Tuberculosis, Drug resistance, MDR, XDR, Demographics

BACKGROUND

In the world, Pakistan has the sixth largest population and has the fifth greatest burden of TB. With an estimated of 27,000 drug resistant TB cases each year Pakistan also ranks 6th for drug resistant TB among the 30 high burden countries.[1] WHO estimates that about half a million cases of multi-drug or rifampicin resistant (MDR/RR-TB) occur each year.[2]

Extensively drug-resistant TB (XDR-TB) is on an increasing trend, but is considerably underreported.[3] One of the studies conducted in Pakistan show raising trend in MDR and as well as XDR TB.[4]

Emergence of drug resistant tuberculosis (DR-TB) has overburdened tuberculosis (TB) related public health issues, especially in low-income settings.

Correspondence: Dr Anika Iqbal, Sindh Infectious Disease Hospital and Research Center, Karachi Pakistan, Karachi Pakistan

Email: aniqaiqbal@hotmail.com

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As per the End TB Strategy, by the year 2030, the WHO intends to decrease death rates by 90% and incidence rates by 80%.[5] To accomplish these targets, the decline in TB incidence needs to be approximately 4–5% per year. But the WHO 2018 TB report recognized multidrug resistant TB (MDR-TB) as the dominant factor in hampering that goal.[6] A global total of 206,030 people with multidrug- or rifampicin-resistant TB (MDR/RR-TB) were detected and notified in 2019, a 10% increase from 186,883 in 2018.[7] Even with advancements in molecular and diagnostic methods, MDR-TB is on the rise where treatment success rate is between 50 and 60%,[5] therefore, additional characteristics including socioeconomic and sociocultural factors need to be looked at while targeting and treating patients with MDR-TB.

Studies identify previous exposure to TB or MDR-TB, prior history with anti-TB medication, late diagnosis, inadequate drug regimens, irregular follow-ups, age, gender, low socioeconomic status, limited education status and poor compliance as associated risk factors for

MDR-TB.[8-10] A study conducted in Punjab, Pakistan identified that advanced age and prior history of TB treatment were the main cause of MDR-TB.[11]

Economic affairs directly affect patient compliance and the quality of care. Due to economic strains, patients with TB may delay seeking medical care, since most low-income families do not have health insurance and medical expenses may cost more than their monthly allowance. Low-income families usually have larger number family members (8–10 people) that share small living areas. A single member infected with TB in a large family unit may significantly increase transmission both within households and local communities.[12] In addition, an interrelation between economic status and education level prevails in Pakistan,[13] consequently, illiteracy can interfere with understanding of disease and treatment information, leading to improper drug use and subsequently drug resistant TB.

Long distances and associated costs may limit patients from following repeated treatments compulsory for MDR-TB, conclusively transforming into extensive drug-resistance TB (XDR-TB). Travelling usually is more challenging for female patients, who have limited freedom and access to healthcare in Pakistan. [(14)] Due to an average of three hours of travelling and the same amount of time spent at treatment centers, patients predominantly complained of fatigue and weakness during travel and therefore delayed or altogether avoided treatments due to the long distance, and costly, tiring trips.[15] These are a few socioeconomic and sociocultural factors which need to be dealt with when scheming effective treatment plans for MDR-TB patients.

MATERIAL AND METHODS

This cross-sectional study was conducted at The Indus Hospital (TIH), Karachi for six months. Non-probability consecutive sampling technique was applied.

All patients > 14 years of age who were being treated as DRTB on basis of GeneXpert and/or DST. Those patients who agree and sign the consent form. Patients who have first line drug sensitive Pulmonary or Extra pulmonary TB. Patients who are < 14 years old. Those who do not sign the consent form.

After approval from IRB (IRD-IRB-2019-09-007) all eligible patients were enrolled in the study through TIH DRTB out-patient department. Consent was obtained. Then data on patients age, gender, employment status, level of education, height, weight, BMI, current salary, number of rooms and people in the house, marital status, place of residence, were gathered on a pre- designed Performa and filled either by the patient (if literate) or the investigating team (if the patient was illiterate or did not understand the form).

Statistical analysis: Data was entered in Redcap software and analyzed using SPSS version 24.0. Mean ± SD or Median (IQR) was computed as appropriate for all the quantitative variables like age, BMI, duration on treatment, years of education and current salary. All categorical variables, i.e., gender, type of TB and occupation were presented as frequency and percentages.

RESULTS

A total of 118 patients with TB were enrolled in this study, of these, majority of the participants were of MDR TB type (n=84; 71.1%) followed by Pre-XDR (n=26; 22%) and XDR (n=3; 2.5%), however, the least number of participants were having Mono DR (n=4; 3.4%) and Poly DR (n=1; 0.8%), (Table-1).

Female patients were 61(51.7%). The median (IQR) of age and BMI of all the participants was 31.5(22.8-45.3) years and 18.6(16.3-22.1) kg/m2 respectively. Details are given in Table-2.

Different socio-economic variables of tuberculosis patients (n=118) are given in Table-3. The median of Current salary was 17500(11625-25750). Average number of people in one house was 7(5-9), majority of the participants were married (n=64; 54.2%) and only 35.6% participants were employed. Illiterate patients were 50(42.3%), those who had studied till matric were 24(20.3), and graduated 9 (7.6%). Higher proportion of participants were from urban areas (n=107; 90.7%).

Table-1: Resistance pattern in study participants.

Type of TB in study participants	n (%)
MDR TB	84 (71.1)
Pre XDR TB	26 (22)
XDR TB	3 (2.5)
Mono DR	4 (3.4)
Poly DR	1 (0.8)

MDR TB: Multidrug Resistant tuberculosis, Pre XDR TB: Pre extensively drug resistant tuberculosis, XDR TB: extensively drug resistant tuberculosis, Mono DR, mono drug resistant tuberculosis, Poly DR: Poly drug resistant tuberculosis

Table-2: Demographics of Study participants.

Age	**Years**
Min-Max	16-65
Median(IQR)	31.5(22.8-45.3)
Gender	**n (%)**
Male	57 (48.3)
Female	61 (51.7)
Total	**118 (100)**
BMI	**kg/m^2**
Min-Max	11-37.9
Median(IQR)	18.6(16.3-22.1)
Marital Status	**n (%)**
Never married	44 (37.3)
Currently married	64 (54.2)
Divorced	2 (1.7)
Widow	8 (6.8)
Total	**118 (100)**

IQR: inter quartile range

Table-3: Economic conditions of study participants.

Current Salary	**PKR**
Min-Max	3000-75000
Median (IQR)	17500(11625-25750)
Employment status	**n (%)**
Job less	76(64.4)
-Never did a job	50(65.8)
-Leave job	23(30.3)
-Asked to leave job	2(2.6)
-Retired	1(1.3)
If you are currently working	42(35.6)
Total	**118(100)**
Education	**n (%)**
Illiterate	50(42.4)
Primary (1 to 5)	15(12.7)
Secondary (6 to 8)	11(9.3)
Matric (9 to 10)	24(20.3)
Intermediate	9(7.6)
Bachelors and above	9(7.6)
Total	118(100)
Place of Residence	**n (%)**
Rural	11(9.3)
Urban	107(90.7)
Total	118(100)
Number of people in house	**n**
Min-Max	1-37
Median(IQR)	7(5-9)
Rooms in house	**n (%)**
1 room	26(22)
2 rooms	40(33.9)
3 rooms	16(13.6)
4 rooms and above	36(30.5)
Total	**118(100)**

Min: minimum, Max: maximum, IQR: interquartile range

DISCUSSION

This study observed that more female patients, 61(51.7%), visited regarding drug-resistant pulmonary tuberculosis treatment, as shown in other studies.[16] Studies have demonstrated a lower ratio of females as they had trouble traveling long distances,[14] but surprisingly, our study demonstrated a higher percentage. US-based research showed an equal ratio,[17] while another one in China showed male predominance,[18] which indicates a difference in the trend of gender dominance in different geographic areas in cases of DR TB.

Most patients seen in this study were young, ranging from 21 to 31 years (27.9%). In the US, TB was more prevalent in a somewhat similar age group (25-40 years) in non-white patients, while patients aged >70 years in white patients.[19] Local studies showed similar age group prevalence, such as those in India,[20] Pakistan,[8] and Bangladesh.[21] This is likely due to the high prevalence of tuberculosis in our setting and may be attributable to this age group's more active social lives, contributing to more opportunities to acquire the infection.

Most of the patients had no jobs. Of those with employment, most were getting low salaries of less than 17500 PKR, which is also shown in many national and international studies that showed poor economic status increases the risk of pulmonary tuberculosis.[22-23] Poverty has been associated with increased chances of conversion to DR TB and after acquiring MDR TB.[24] Studies like these pave the way for authorities to have data on which strategies to formulate support programs for control and prevention of TB can be based.

Low income can lead to malnutrition, a risk factor for tuberculosis. Our study showed that most patients were 58(49.1%) with a low BMI <18.5. This has been demonstrated in previous studies also.

Our study showed that 90% of patients were from an urban setting, while the rest were from a rural background. This finding may be because the study was done in a hospital in Karachi, the largest and most populated city in Pakistan. Another reason could be a more prevalent treatment-seeking attitude in the urban setting, as evidenced by other studies.[26]

Many international studies found a significant and convincing relationship between housing density and tuberculosis, as tiny houses had poor ventilation systems[27] and were predisposed to pulmonary tuberculosis. Our findings are equable with these as it reports, 33.9% of the patients were residing in tiny houses (2 rooms). Our study revealed a high burden of resistant pulmonary tuberculosis among overcrowded and populous communities, i.e., 55.9% (n=66) lived in less than three rooms; 39.8% (n=47) patients were living

in crowded places with more than seven family members per house. This was also seen in many international studies, which found a significant and robust relationship between tuberculosis and overcrowding[28,29]\among populous residential settings. Furthermore, in another study, high frequency (85.0%) of tuberculosis showed a significant and robust relationship with overcrowding. Thus, one person per room (PPR) increased the risk to about 40% in a congested community.[30]

In the current study, TB was most common in illiterate individuals, followed by patients which had completed education till secondary classes (enrollment). Similar findings were reported in previous studies,[31,32] which shows illiteracy as the main factor for non-compliance with drug intake and incomplete understanding of the disease process leading to drug-resistant tuberculosis. Furthermore, a study conducted by Pandit and Choudhary supports our findings, where 50% of the patients studied till primary school, and 23% were uneducated. An analysis has noted that literate individuals have better visible knowledge of TB and have lesser possibility to possess the disease.[33]

One of the most important strengths of our study is that it's one of the very few studies from our country, which includes patients from all types of drug-resistant TB groups such as MDR, Pre-XDR, XDR, mono DR, and poly DR TB. Our study has some limitations, one of which is the small sample size and being a single-center study. A comparative analysis between drug-sensitive and drug-resistant TB would have provided a better insight into the factors that contribute more towards drug-resistant TB.

CONCLUSION:

From the results, it can be observed that drug resistance tuberculosis shows a strong association with most of the collateral reasons. Thus, it was more frequent among low-income patients, patients living in tiny houses with fewer rooms, and overcrowded communities. Patients who are jobless and illiterate further contribute to drug resistance tuberculosis and are a reason for the high prevalence of MDR TB among such groups. Thus, it is needed to increase the awareness of the target population to improve the housing condition, improve literacy to promote compliance and resolve misunderstandings about anti-tuberculous drugs and reduce the vulnerability and frequency of multidrug resistance tuberculosis.

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