Original Research Article

Assessment of demographic characteristics of patients with tuberculosis and treatment profile of revised national tuberculosis control programme in Purba Bardhaman district of West Bengal

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ABSTRACT

Background: Tuberculosis is a communicable disease caused by *Mycobacterium tuberculosis* bacteria spread by droplet infection. India is classified to be among those with a high TB burden, contributing 26% of the total TB cases, globally. The objective of this study is to access the clinical and demographic characteristics of patients with tuberculosis to determine the nature of disease, its co-morbidities, and treatment profile of the patients attending the revised National TB control programme clinics.

Method: This study was carried out with data collection from the District Tuberculosis Office (DTO) section of Purba Bardhaman district, West Bengal. Data relevant to the study were collected for four consecutive years, from 2017 to 2020, and were analysed using suitable statistical software.

Results: In the year 2017, 2018, 2019 and 2020, there were 6569, 5534, 5964 and 4012 reported cases of TB, respectively. Out of the total cases, 73.78% were male patients. It was observed that 97.24% patients were aged ≥15. Majority of the patients, 73.97%, had pulmonary TB. 1.92% cases had drug resistance tuberculosis (DRTB). The comorbid conditions associated with TB revealed that 7.58% TB patients had diabetes and only 0.48% cases had TB-HIV. The rate of successful treatment was 88.49%. The average rate of mortality was found to be 5.27% of reported cases.

Conclusions: There was a significantly high proportion of male patients afflicted with TB in the region under study and the patients ≥15 years were mostly affected. The average rate of mortality was had increased in each year from 2017 to 2020.

Keywords: RNTCP, DTO, DRTB, Pulmonary TB, Extra-pulmonary TB, TB-HIV, TB-diabetes

INTRODUCTION

Tuberculosis is a communicable disease, which can be transmitted from person to person by droplet infection, and it usually affects lungs.[1] It is caused by the bacterium called *Mycobacterium tuberculosis*.[2] Tuberculosis (TB) generally affects the lungs, but it can also affect other parts of the body, which is characterized by chronic cough with blood-containing mucus, fever, night sweats and weight loss. TB occurs in every part of the world. In 2019, the highest number of new TB cases occurred in the South-East Asian region, with 44% of new cases, followed by the African region, with 25% of new cases and the Western Pacific with 18%.[3] In the same year, 87% of new TB cases occurred in 30 high TB burden countries. Eight countries, India, Indonesia, China, Philippines, Pakistan, Nigeria, Bangladesh and South Africa, accounted for two thirds of the new TB cases.[3]

Although tuberculosis is primarily a pulmonary sickness produced by the deposition of *Mycobacterium tuberculosis* onto lung alveolar surfaces via aerosol particles, it can damage bone, the central nervous system, and a range of other organ systems. From here, the disease might go a variety of distinct directions, all of which are influenced by the immune response of the host. Intrinsic variables, like the immune-genetics, as well as extrinsic factors, such as immune system insults and the host's nutritional and physiological status, influence the efficacy of this response. Furthermore, the pathogen may play a role in disease progression because some *M. tuberculosis* strains are thought to be more virulent than others, as evidenced by enhanced transmissibility and higher morbidity and mortality in infected people.[4]

In 1962, the government started "The National TB programme" (NTP), which consisted of a district TB centre model that included BCG vaccination and TB treatment. BCG vaccination was moved to the expanded programme on immunization in 1978. The Government of India, the world health organization (WHO), and the Swedish international development agency (SIDA) conducted a joint review of NTP in 1992. Around the same time in 1993, WHO declared tuberculosis a worldwide emergency and developed the directly observed treatment short course (DOTS), which all countries were advised to follow. In the same year, the Indian government resurrected NTP as the revised National TB control programme (RNTCP). DOTS was first introduced in 1997 as the RNTCP strategy, and by the end of 2005, the entire country had been covered.[5] RNTCP has released a 'National strategic plan for tuberculosis 2017-2025' (NSP) for the control and elimination of TB in India by 2025. According to the NSP, TB elimination has been integrated into the four strategic pillars of "detect-treat-prevent-build (DTPB)". Private providers are given incentives for TB case notification, treatment adherence, and treatment completion in order to promote the public-private mix (PPM) in TB prevention and care.

The incentives are distributed directly to the beneficiaries. Patients with tuberculosis who seek treatment in the private sector are given free medications and diagnostic tests. RNTCP has created a case-based web-based TB surveillance system called "NIKSHAY" for both government and private health care facilities to make TB notification easier. Future NIKSHAY enhancements will focus on patient support, logistics management, direct data transfers, adherence support, and support for interface agencies that are helping to expand the program's reach. The National tuberculosis elimination programme's (NTEP) National strategic plan (2017-2025) lays out numerous initiatives for eliminating tuberculosis in India by 2025. NTEP integrates with the Ayushman Bharat health and wellness centers (AB-HWC) programme to bring TB services to people's doorsteps across the country. In India, a total of 2324674 and 2882793 tuberculosis cases were reported in all states in 2017 and 2018, respectively.[6] In 2019, over 10 million people contracted tuberculosis and 1.4 million died worldwide. In India, more than 2.6 million people have contracted tuberculosis, with 43600 of them dying in 2019. 125000 persons in West Bengal contracted tuberculosis in 2019.[3]

Objectives

The objective of the present study was to study the clinical and demographic characteristics of TB patients registered under revised National TB control programme, to determine the nature of the disease, its co-morbidities and treatment profile of the patients attending the RNTCP clinics in Purba Bardhaman District, West Bengal.

METHODS

Study design and study duration

It was a retrospective cross-sectional study based on the analysis of secondary data. This study was done as a part of the dissertation work for M.Sc. course in Zoology with specialization in Immunology and the data were collected from the DTO (district tuberculosis office) section Purba Bardhhaman. Data were collected from the year 2017 to 2020. Data related to total number of reported cases, gender of patients, age group, TB type, co-morbidities associated with TB (HIV or Diabetes) and treatment outcome were obtained for each year from 2017 to 2020, annually.

Data collection

The data collection was done using RNTCP records (NIKSHAY data base) which are maintained in the RNTCP clinics. Demographic profile of TB patients, type of TB for which the patient was treated, treatment outcome, co-morbidities associated with TB were extracted from the data base. Data were collected using a structured questionnaire. Data obtained were tabulated using Microsoft Excel 2019 for further analysis.

Inclusion and exclusion criteria

All patients who registered with the RNTCP unit during the period of January 2017 to December 2020 were included. The patients who registered beyond December 2020 period were excluded.

Statistical analysis

All the statistical analysis and graphical presentations were done with the help of Microsoft Excel 2019 and Kyplot 6.0. Statistical comparisons between the groups were done using the Chi-square test, $p<0.05$ was considered statistically significant. The data was collected after obtaining permission from the chief medical officer of health (CMOH), Purba Bardhaman.

RESULTS

Total reported TB cases in Purba Bardhaman district of West Bengal were 6569, 5534, 5964 and 4012 in 2017, 2018, 2019 and 2020, respectively (Figure 1). Total data collected for the analysis are presented in (Table 1). There was the preponderance of male gender and the percentages of male TB cases were 75.45%, 73.02%, 72.07% and 74.60% in 2017, 2018, 2019 and 2020, respectively.

Table 1: Summary of data collected for the analysis.

Variables			2017	2018	2019	2020
Number of reported cases	Total cases		6569	5534	5964	4012
	Male		4956	4041	4298	2993
	Female		1613	1490	1665	1019
	Transgender		0	3	1	0
Age (years)	<15		223	169	153	82
	≥15		6346	5365	5811	3930
Tuberculosis type	Pulmonary TB Cases	Male	4200	3130	3354	2332
		Female	1071	818	917	582
		Transgender	0	3	1	0
	Extra-Pulmonary TB Cases	Male	754	908	923	633
		Female	542	671	738	430
		Transgender	0	0	0	0
	Other		2	4	31	35
Disease type	DSTB cases		6513	5392	5837	3927
	DRTB cases		56	142	127	85
Patients with comorbidities	TB-HIV cases		23	32	39	14
	TB-Diabetes cases		279	378	553	400
Success of treatment	Cured cases		3592	3076	3137	2246
	Treatment complete cases		2111	1891	2190	1287
	Total success		5703	4967	5327	3533
Died cases			305	293	324	229

Percentage of female among the total reported TB cases were 24.55%, 26.92%, 27.92% and 25.40% in 2017, 2018, 2019 and 2020, respectively. Only 3 and 1 transgender TB patients were there in 2018 and 2019, respectively which is 0.05% and 0.01% of the total number of reported TB cases (Figure 2). The difference in gender (male vs. female) afflicted with TB is statistically significant ($\chi 2$=27.227; p<0.001).

2.56%, 2.04% in 2017, 2018, 2019 and 2020, respectively (Figure 3). This result indicates that <15 years old are less affected with the average of 2.78% than ≥15 years with the average of 97.24% from the year 2017 to 2020 in Purba Bardhhaman.
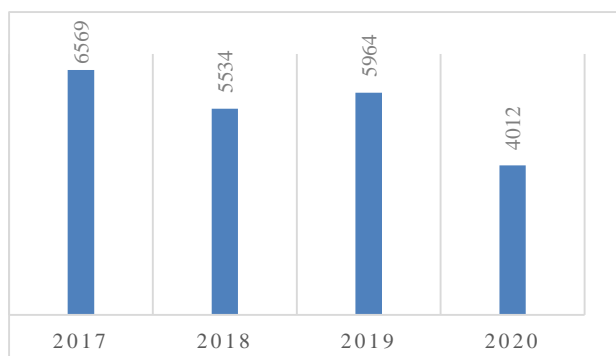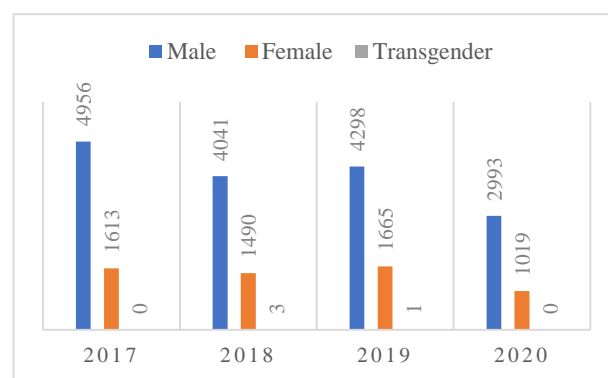

Figure 1: Number of reported TB cases from 2017 to 2020 in Purba Bardhaman district, West Bengal.

Total TB patients were divided into two age groups viz. <15 years and ≥15 years. The percentages of patients of age group ≥15 years were 96.61%, 96.95%, 97.44% and 97.96% and age group <15 years were 3.39%, 3.05%,

Figure 2: Gender variation among reported TB cases from 2017 to 2020 in Purba Bardhaman district, West Bengal.

The independence in contingency was significant statistically (χ^2=19.089; p<0.001). Percentage of DRTB was relatively low among total reported patients with a percentage of 0.85% for 2017, 2.57% for 2018, 2.13% for 2019 and 2.12% for 2020. DSTB was most common

within total reported patients with the percentage of 99.15% for 2017, 97.43% for 2018, 97.87% for 2019 and 97.88% for 2020. On an average 1.92% patients of reported patients were DRTB cases. Between pulmonary and extra-pulmonary TB, pulmonary TB was most common among the reported patients with the percentage of 80.24% for 2017, 71.39% for 2018, 71.63% for 2019, and 72.63% for 2020 (average 73.97%). Extra-pulmonary cases were 19.73%, 28.53%, 27.85% and 26.49% respectively for the total reported TB patients from 2017 to 2020 (average 25.65%). On an average 79.36% of reported pulmonary TB cases were male and 20.62% were female. All the reported transgender cases for the year 2018 and 2019 were pulmonary TB cases.
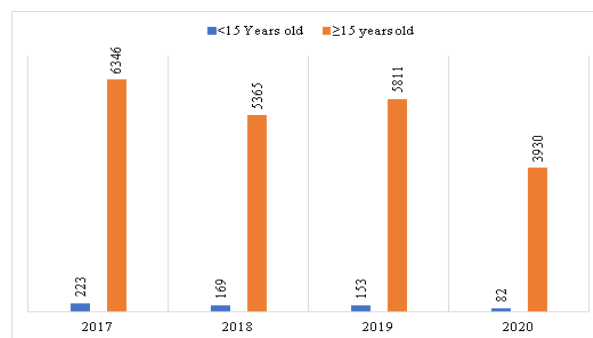

Figure 3: Age variation among reported TB cases from 2017 to 2020 in Purba Bardhaman district, West Bengal.

Table 2: Number of total cases, cured cases, treatment complete and total successful cases under RNTCP from 2017 to 2020.

Year	N	Cured, N (%)	Treatment completed, N (%)	Total success, N (%)
2017	6569	3592 (54.68)	2111 (32.14)	5703 (86.82)
2018	5534	3076 (55.58)	1891 (34.28)	4967 (89.75)
2019	5964	3137 (52.60)	2190 (36.72)	5327 (89.32)
2020	4012	2246 (55.98)	1287 (32.08)	3533 (88.06)

Analysis of the comorbid conditions associated with TB revealed that 0.35%, 0.58%, 0.65%, 0.35% of reported TB patients also had HIV (average 0.48%) in 2017, 2018, 2019 and 2020, respectively. The percentages of TB-Diabetes cases were 4.25%, 6.83%, 9.27%, 9.97% in 2017, 2018, 2019 and 2020 (average 7.58%), respectively. Success rate of RNTCP treatment from 2017 to 2020 in Purba Bardhhaman is shown in (Table 2). On an average, 54.71% of reported cases were cured, 33.81% of reported cases were treatment complete cases and the total success was 88.49% for the studied period. Death rates among the reported cases were 4.64% in 2017, 5.29% in 2018, 5.43% in 2019 and 5.70% in 2020. It is clear that death rate for TB has increased in each individual year from 2017 to 2020 in Purba Bardhaman (Figure 4). Average death rate was 5.27% for the studied period.
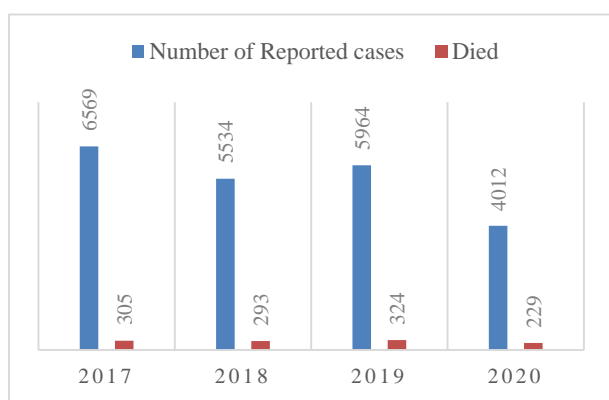

Figure 4: Number of deceased cases due to TB among reported cases from 2017 to 2020 in Purba Bardhaman district, West Bengal.

DISCUSSION

In the present study, the number of TB cases showed an overall declining trend within the studied period. Most of the affected patients were male (73.87%) and this could be due to their frequent exposure to the infectious agents as they go out for work under different environmental conditions. Similar observations were found in studies conducted by Kundu et al., Sumana et al., and Shalini et al., where percentages of male patients were 67.25%, 70.5%, and 71.1%, respectively.[7-9] Most of the affected patients were from the age group of ≥15 years old (97.24%). Studies reported by Sumana et al., and Sumit et al., also revealed that most of the patients were from the age group of 25-44 years (47.5%) and 40-49 years (18.7%), respectively.[8,10] This could also be related to the professional exposure to infectious agents of people of age group ≥15 years which makes them more prone to develop the infectious disease.

In this study, 1.92% of reported patients were DRTB cases however in a study conducted by Shivekar er al it was 5.4%.[11] In this current study, the pulmonary and extra pulmonary cases were 73.97% and 25.65%, respectively, which are similar to the finding of the study conducted by Kundu et al., where they reported 74% of pulmonary cases.[7] However, Dey et al., in their study reported pulmonary cases being 89.3% and extra-pulmonary as 10.7% for the district East Midnapore of West Bengal.[12] In the present study, 7.58% patients had diabetes with TB which is far less as compared to the findings reported by Mohan et al and Kundu et al.[7,13] Only 0.48% TB patients had HIV co-infection, which is very low as compared to the estimated 8.2% by WHO and 2% reported by Kundu et al.[3,7] In this study, 33.81% cases were treatment

completed cases, which is quite higher than 16.7% reported by Karanjekar et al and lower than 41% reported by Kundu et al.[7,14] Total success rate of RNTCP in studied area for the studied period was 88.49% in this study which is almost equal to data (88.0%) shown by Agarwal et al.[15] In the present study, death rate among the reported TB cases was found to be 5.27%, which is slightly lower than the data of 6.9% shown by Rana et al in the Bhatar block of Purba Bardhaman district.[16] Current study was conducted in Purba Bardhaman district of west Bengal based on the secondary data provided by DTO section. Sophisticated demographic data was not available to determine the prevalence and incidence of TB in this region. Further analysis between variables cannot be done because of lack of data. Further studies could be done by collecting the raw data by means of survey and finding different factors associated with TB.

CONCLUSION

In the present study, the male patients comprise the majority of the reported TB cases in Purba Bardhaman district of West Bengal. The patients of the age group ≥15 years were mostly affected. Death rate had increased in each year from 2017 to 2020.

The Government of India is putting efforts to reduce the burden associated with tuberculosis by revising plans and implementing them across the country. However, there is still a long way to achieve the significant reduction of burden of TB cases. More awareness campaign is necessary to increase the awareness about TB among common people. Ensuring all patients visiting RNTCP clinic timely would help early diagnosis and treatment to prevent TB cases and death due to TB. More awareness generation and proper counselling on DRTB, HIV-TB, TB-Diabetes are needed to facilitate diagnostic and treatment services.

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