A study on the Socio-Demographic and the Clinical Profiles, along with some Management Indicators, of the MDR TB patients at the Domjur Block, Howrah District, West Bengal, India

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Abstract

Multidrug-resistant tuberculosis (MDR TB) is a major challenge to any TB control programme. This cross-sectional study recorded data about six important criteria related to the socio-demographic profile of 23 MDR TB patients at the Domjur Block, India, in 2018, to find out the influences of these criteria on the occurrence of MDR TB in that block, during that time; the six criteria are: age, sex, religion, educational status, occupational status, and family income. Also this work studied the clinical profile of those MDR TB patients, and some key indicators corresponding to the management of those patients by the health centre at the Domjur Block. The indicators are expected to help in understanding how the RNTCP (Revised National Tuberculosis Control Programme) of the Government of India, was going on in that block, in 2018. The Domjur Block was selected by the random sampling method. Relevant data were collected by interviewing the patients, using a predesigned, pretested, structured questionnaire. The binomial test, done at 5% level of significance, in case of the socio-demographic criteria, shows that, only age, educational status, and family income significantly influenced the occurrence of MDR TB at Domjur, the influence of educational status being the most significant. Thus, higher education and increase in income, can help in combatting MDR TB. On the other hand, the indicators pertaining to the management of the MDR TB patients, show that the RNTCP was going on reasonably well; however, a lot was yet to be achieved.

Keywords: MDR TB, Socio-Demographic Profile, Clinical Profile, Domjur Block, Cross-Sectional Study, Binomial Test, RNTCP

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Introduction

Tuberculosis (TB), caused by Mycobacterium tuberculosis, is the main cause of death worldwide, due to a single infectious agent (Mello, Silva, & Dalcolmo, 2018). The global threat of TB is so grave that, in 1993, the World Health Organization (WHO) declared TB a global emergency (Zumla & Grange, 1998). TB is principally a disease of poverty, and globally, 95% of the cases and 98% of the deaths, due to TB, occur in the developing countries (Grange & Zumla, 2002). In 2018, around 10 million people had TB worldwide, and India bore 27% of that global TB burden (World Health Organization, 2019).

Multidrug-resistant TB (MDR TB) is resistant to both isoniazid and rifampicin (the two standard TB drugs), and may or may not be resistant to other drug/s; hence, it (i.e., MDR TB) is a great cause of worry, and a major challenge to any TB control programme. Moreover, MDR TB has been spreading across the globe. In 2018, there were around half a million new cases of rifampicin-resistant TB (78% of them had MDR TB) (World Health Organization, 2019); and India shared 27% of that global burden (World Health Organization, 2019). Generally, the causes of occurrence of MDR TB are: irregular intake of drugs, noncompletion of the full course of treatment, delayed and/or wrong treatment, insufficient and/or poor quality drugs, and transmission of the disease from an MDR TB patient; besides, host genetic factors may possibly contribute to the occurrence of this disease.

The objective of this project is to study the socio-demographic and the clinical profiles, along with some management indicators, of 23 MDR TB patients at the Domjur Block, Howrah District, West Bengal, India, in 2018. Thus, it is a twofold study with two sub-objectives.

One of the sub-objectives is to study six important criteria related to the socio-demographic profile of 23 MDR TB patients at the Domjur Block, to find out the influences of these criteria on the occurrence of MDR TB in that block, in 2018. These six criteria

are: age, sex, religion, educational status, occupational status, and family income. For studying the influences of the aforesaid criteria on the occurrence of MDR TB at the Domjur Block, the binomial test was done at 5% level of significance. The formula for calculating the p-value (p1) is:

$$p1=2n!/((n-X)!X!)p^{X}q^{((n-X))} \quad (1)$$

where, n=total number of MDR TB cases=23;

X=n/2=11.5≈12;

p=proportion of cases corresponding to the first variable pertaining to a criterion;

q=proportion of cases corresponding to the second variable pertaining to the same criterion.

If p1<0.05, for a criterion, then it can be inferred that the relevant criterion had a significant influence on the occurrence of MDR TB at Domjur; otherwise the influence was not significant.

The other sub-objective of this work is to record data about the clinical profile of those 23 MDR TB patients, and some key indicators corresponding to the management of those (MDR TB) patients by the health centre at the Domjur Block. The indicators are expected to help in understanding how the RNTCP (Revised National Tuberculosis Control Programme) of the Government of India, was going on in that block, in 2018.

The Domjur Block was selected by the random sampling method among the blocks of the Howrah District (Howrah is a district of West Bengal which is one of the states of India). The population of this block is 377585 (as per the 2011 census), and it had 217 TB cases (under treatment), at the time of this work (2018). Among those 217 patients, 23 had MDR TB, on whom this cross-sectional study was done. Relevant data, regarding the socio-demographic and the clinical profiles, and also the management indicators, were collected by interviewing the patients, using a predesigned, pretested, structured questionnaire.

Before performing this study, a brief literature survey was done, but no work related to the MDR TB patients of Domjur, was found.

Methodology:

a) Study area: A map of the study area i.e., the Domjur Block is shown in figure-1.

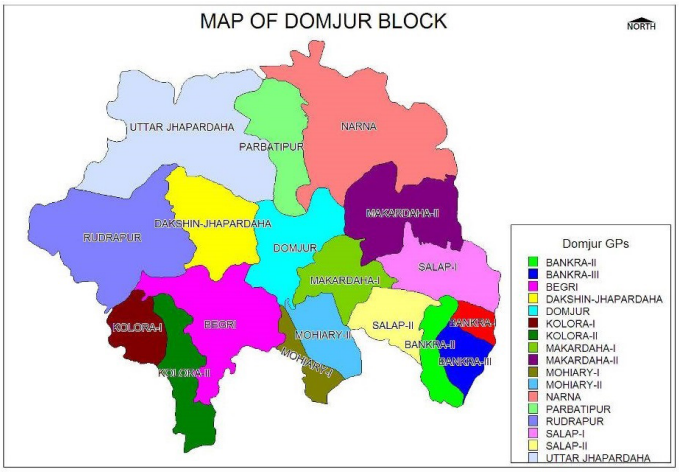

Figure-1: The Study Area

[GP: Gram Panchayat] (Government of West Bengal, 2020)

b) Method: The flowchart describing the method is depicted in figure-2.

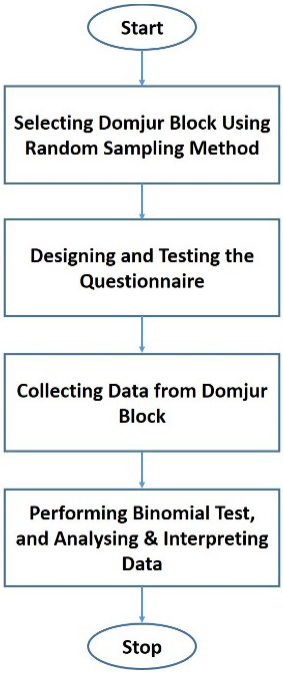

Figure-2: The Method

Results and Discussions:

The collected data corresponding to the socio-demographic profile, and the results of the binomial test, are as follows:

Table-1 depicts the age distribution of the MDR TB patients.

Table-1: Age Distribution of the MDR TB Cases

0-39 Years	40 Years & Above	Total
17	6	23
74%	26%	100%

As per table-1, the number of MDR TB cases at the Domjur Block was higher in the age-group of 0-39 years (74%). Here, p-value is: 0.0268<0.05; therefore age had a significant influence on the occurrence of MDR TB at Domjur.

Table-2 depicts the sex distribution of the MDR TB patients.

Table-2: Sex Distribution of the MDR TB Cases

Male	Female	Total
10	13	23
43%	57%	100%

As per table-2, the occurrence of MDR TB was higher among the females (57%) at the Domjur Block. Here, p-value is: 0.2230>0.05; therefore sex did not have a significant influence on the occurrence of MDR TB at Domjur.

Table-3 depicts the religions of the MDR TB patients.

Table-3: Religions of the MDR TB Cases

Hinduism	Islam	Total
10	13	23
43%	57%	100%

As per table-3, higher number of MDR TB patients of the Domjur Block belonged to the Muslim community (57%). Here, p-value is: 0.2230>0.05; therefore religion did not have a significant influence on the occurrence of MDR TB at Domjur.

Table-4 depicts the educational status of the MDR TB patients.

Table-4: Educational Status of the MDR TB Cases

No Education/Education up to School Level (Class-XII)	Education Higher Than School Level	Total
21	2	23
91%	9%	100%

As per table-4, at the Domjur Block, higher number of MDR TB patients either had no education or got education up to school level (class-XII) (91%). Here, p-value is: 2.7366X10-6<0.05; therefore educational status had a significant influence on the occurrence of MDR TB at Domjur.

Table-5 depicts the occupational status of the MDR TB patients.

Table-5: Occupational Status of the MDR TB Cases

Doing Job Involving Manual Labour	Not Doing Job/Doing Job Not Involving Manual Labour	Total
10	13	23
43%	57%	100%

As per table-5, the occurrence of MDR TB at the Domjur Block was higher among people who were either not doing any job, or doing a job which did not involve manual labour (57%). Here, p-value is: 0.2230>0.05; therefore occupational status did not have a significant influence on the occurrence of MDR TB at Domjur.

Table-6 depicts the family incomes of the MDR TB patients.

Table-6: Family Incomes (in Rupees/Month) of the MDR TB Cases

≤10000	>10000	Total
17	6	23
74%	26%	100%

As per table-6, the occurrence of MDR TB was higher among people with family income less than/equal to Rupees 10000 per month (74%), at the Domjur Block. Here p-value is: 0.0268<0.05; therefore family income had a significant influence on the occurrence of MDR TB at Domjur.

Figure-3 gives a qualitative idea about the influences of the six criteria on the occurrence of MDR TB at Domjur.

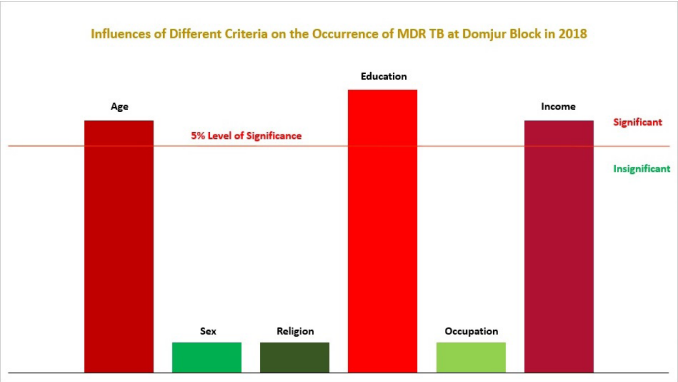

Figure-3: Graph Showing Qualitatively the Impacts of Different Criteria on the Occurrence of MDR TB at Domjur

[Here, lower the p-value, higher is the corresponding bar. The expression used for drawing the graph is: ((100(1-p1))-75), where p1 is given by equation (1).]

Figure-3 depicts that age, educational status and family income had significant influences on the occurrence of MDR TB at Domjur. And, the significance of the influence of educational status was maximum. Figure-3 also shows that sex, religion and occupational status did not have significant influence on the occurrence of MDR TB at Domjur.

The outcomes of the binomial test indicate the following:

- Education is expected to increase knowledge and awareness regarding MDR TB, the causes of its occurrence, and the ways of treatment. Hence, higher the education level of a person, lower is the possibility that he will have MDR TB. That is why, the influence of education on the occurrence of MDR TB was of highest significance.
- With age, a person generally gains experience, and this experience can be expected to increase awareness about MDR TB. Thus, with age, the chance of having MDR TB decreases. Thus, age also had a significant influence on the occurrence of MDR TB.
- Poverty (causing nutritional deficiency) is mostly responsible for the occurrence of TB. This statement should be applicable to the case of MDR TB also. Hence, higher the family income, lower is the chance of occurrence of MDR TB. That is why, family income had a significant influence on the occurrence of MDR TB.
- The occupational status of a person did not have a significant influence on the occurrence of MDR TB. This is probably because, even if a person does a job involving a lot of manual labour, he will not have MDR TB, provided that he gets sufficient amount of food, i.e., provided that his family income is sufficient.
- Sex and religion did not exert significant influences on the occurrence of MDR TB, and this result is quite expected.

- Thus, the following two moves by the pertinent authority can help in lessening the occurrence of MDR TB:
- Making arrangements for public education, up to college (undergraduate) and, if possible, university (graduate and higher) levels.
- Taking steps for increasing the income of people to ensure good nutritional status. In this regard, it may be stated that the Nikshay Poshan Yojana of the Government of India, which was started on 1st April, 2018, provides financial support to the TB patients to improve their nutritional status.

The collected data pertaining to the clinical profile and some management indicators of the MDR TB patients are as follows:

Table-7 shows the signs & the symptoms of the MDR TB patients.

Table-7: Signs & Symptoms of the MDR TB Cases

Cough	Low Grade Fever	Weight Loss	Respiratory Distress	Chest Pain	Loss of Appetite	Weakness	Night Sweat	Haemoptysis
23	16	15	6	11	11	6	5	5
100%	70%	65%	26%	48%	48%	26%	22%	22%

Table-7, which actually represents the clinical profile, shows that, at the Domjur Block, 100% of the MDR TB cases suffered from cough, 70% had low grade fever, 65% experienced weight loss, 26% suffered from respiratory distress, 48% felt chest pain, 48% experienced loss of appetite, 26% suffered from weakness, 22% experienced night sweat, and 22% had haemoptysis.

Table-8 indicates the medical tests done on the MDR TB patients.

Blood Sugar & HIV Tests Done		CBNAAT Done		Chest X-Ray Done		AFB Test Done		Total
Yes	No	Yes	No	Yes	No	Yes	No	
23	0	20	3	21	2	19	4	23
100%	0%	87%	13%	91%	9%	83%	17%	100%

Table-8: Medical Tests Done on the MDR TB Cases

According to table-8, at the Domjur Block, blood sugar and HIV (Human Immunodeficiency Virus) tests were done in case of 100% MDR TB patients, CBNAAT (Cartridge Based Nucleic Acid Amplification Test) was performed in 87% cases, chest X-ray was done in case of 91% patients, and AFB (Acid Fast Bacillus) Test was performed in 83% cases. It may be noted that no patient tested positive for blood sugar and HIV.

Table-9 gives an idea about the various factors essential for offering quality treatment to the MDR TB patients.

Table-9: Factors Essential for Offering Quality Treatment to the MDR TB Patients

Sputum Culture Done		Diagnosis Done & Treatment Started in Proper Time		Medicine Supplied in Proper Time		Regular Visit by Health Staff		Regular Intake of Medicine by Patient		Total
Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	
19	4	22	1	23	0	19	4	16	7	23
83%	17%	96%	4%	100%	0%	83%	17%	70%	30%	100%

As per table-9, at the Domjur Block, sputum culture was done in case of 83% MDR TB patients, diagnosis was done & treatment was started in proper time in 96% of the cases, medicine was supplied in proper time in case of 100% patients, 83% patients were regularly visited by the health staff, and regular intake of medicine by patient was observed in 70% of the cases.

Tables- 8 & 9 depict the indicators corresponding to the management of the MDR TB patients by the health centre at the Domjur Block. The regularity of intake of medicine by the patient depends not only on the patient's own awareness and initiative, but also on the degree to which the patient has been motivated by the relevant health personnel; hence it is also a valid indicator pertaining to the management of the MDR TB patients. The indicators in the tables-8 & 9 reflect the following:

- The RNTCP was going on reasonably well at the Domjur Block, in 2018.
- However, a lot was yet to be achieved, particularly with regard to motivating the patient to regularly take medicine, performing AFB test, doing sputum culture, the practice of regularly visiting the patient by the health staff, performing CBNAAT, doing chest X-ray, and diagnosing the disease & starting the treatment in proper time; hence, there is no room for complacency.

Conclusions

In this work, data regarding six important criteria related to the socio-demographic profile of 23 MDR TB patients of the Domjur Block, Howrah, India, and also about the clinical profile of those MDR TB patients, and some key indicators corresponding to the management of those patients by the health centre at the Domjur Block, have been collected, processed, analysed and interpreted. It has been found that among the six criteria related to the socio-demographic profile, age, educational status, and family income had significant influences on the occurrence of MDR TB at Domjur, the influence of educational status being the most significant. Conversely, sex, religion and occupational status did not exert significant influences on the occurrence of MDR TB. Hence, it may be stated that, higher education and increase in income, can help in combatting MDR TB. On the other hand, the indicators corresponding to the management of the MDR TB patients by the health centre at the Domjur Block, show that the RNTCP was going on reasonably well in that block, in 2018; however, a lot was yet to be achieved.

This project has attempted to throw some light on the relationships between the occurrence of MDR TB and some criteria associated with the socio-demographic profile of MDR TB patients, and also on the performance of the RNTCP, with only a small amount of data.

A more comprehensive picture about the occurrence of MDR TB could have been obtained, if other criteria related to the socio-demographic profile of the MDR TB patients were also incorporated in the study. Besides, if a control group of non-MDR TB patients were included, the results would have been more accurate. Moreover, if other blocks were also considered, higher number of patients would have been available for study, and hence, the scope of the work would have increased. If possible, all these assignments can be taken up in future.

If data on other indicators pertaining to the management of the MDR TB patients by the health centre, were available, a more comprehensive idea about the performance of RNTCP could have been had. This task can also be accomplished in future, if possible.

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