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CLINICAL RISK FACTORS ASSOCIATED WITH MULTIDRUG-RESISTANT TUBERCULOSIS IN BANGLADESH

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ABSTRACT

Background: Multidrug-resistant tuberculosis (MDR-TB) is a solemn barrier to successful TB control. Even though taken as a whole decreasing incidence and mortality rate for tuberculosis (TB), multidrug resistance tuberculosis (MDR-TB) continues to be a severe warning to the current global tuberculosis control effort. **Objective:** The aim of this study was to observe the clinical risk factors associated with MDR-TB in Bangladesh. **Materials and Method:** Based on selective purpose, the sample size was 305. All the patients with MDR-TB were included. **Results:** Regarding age distribution it was found that majority (33.1%) were in the age group of 50+ years, 67.21% were male with 15001-30000 BDT as monthly family income (67.9%) and lived in rural area (83.28%). Majority (52.1%) smoked for >16 years, did not use sanitary latrine (53.8%) and illiterate (77.4%). It was revealed that most (59.7%) were suffering from TB for 6 months with pulmonary TB (90.2%). Majority (89.8%) investigated sputum, 40.3% took drug for the same duration with irregular treatment (82.3%) and laps their treatment after 6 months (70.8%) and finally failed their treatment after 8 months. Around 96.7% used 1st line drug, 94.8% received 2nd line treatment pattern. The relationship between age, weight in Kg, sex of

the respondents and type of TB suffering from of the respondents was found statistically significant ($p<0.01$). **Conclusion:** Previous tuberculosis treatment was found to be the major risk factor for MDR-TB. National Tuberculosis programme should address these risk factors in MDR-TB control strategy.

KEYWORDS: MDR-TB, Risk factors, Bangladesh.

INTRODUCTION

Despite an overall declining incidence and mortality rate for tuberculosis (TB), multidrug resistance tuberculosis (MDR-TB) continues to be a serious threat to the current global tuberculosis control effort.[1,2] Bangladesh is one of the 27 high trouble countries for MDR-TB.[3] In Bangladesh, 1.4% of new tuberculosis patients, and 29% of previously treated tuberculosis patients are apparent to be MDR-TB.[1] Although the proportion of MDR-TB is still little, due to the overall high TB burden in Bangladesh the absolute number of MDR cases is quite large (estimated 1900 for new and 2300 for before treated patients).[1] Bangladesh is unique in that it has one of the maximum population densities in the world, is one of the high saddle countries for TB. Previous studies recognized some risk factors associated with MDR-TB, to be precise previous TB treatment,[4-8] poor past fulfillment with treatment,[8,9] gender,[5,9] living in an urban area,[10,11] type by bacteriology and pulmonary site of TB,[11] smoking or other substance maltreatment,[10,12,13] diabetes.[14] Improper medical management, absence of in a straight line observed treatment, lack of communication between public and private sectors, limited or intermittent drug supply, poor quality and extensive availability of anti-tuberculosis drugs, were also reported as important causes associated with MDR-TB.[6,15,16] Consequently, this study was intended to observe the clinical risk factors associated with MDR-TB in Bangladesh.

MATERIALS AND METHODS

This was a cross sectional type of descriptive study which was conducted in chest disease hospitals in Dhaka and Rajshahi in Bangladesh. All the patients with MDR-TB attending in Chest Diseases Hospitals in Dhaka & Rajshahi, Bangladesh during the study period constituted the study population and included in the study. So, total sample size was taken 305 after calculating the sample size. Purposive sampling technique was used. The researcher himself collected data from the MDR-TB patients attending chest disease hospitals in Dhaka & Rajshahi by face to face interview through a partially structured questionnaire. Baseline information on some selected socio-demographic and biological characteristics of the

respondents and information regarding MDR-TB was collected. All efforts were made to collect data accurately. For open questions, the respondents were asked in such a manner so that they could speak freely and explain their opinion in a normal and neutral way. No leading questions were asked. Statistical analyses of the results were obtained by using window-based computer software devised with Statistical Packages for Social Sciences (SPSS-23). The permission of the authority of Rajshahi Chest Disease Hospital, Rajshahi, and Dhaka Chest Disease Hospital, Dhaka was taken before starting the study.

Statistical analysis

The data were entered and analyzed by using Statistical Package for Social Science (SPSS) version 25 software. The results were expressed in percentage.

Selection criteria of the patients

1. Inclusion criteria: All the MDR-TB patients attending Chest disease hospital, Rajshahi and Chest disease hospital, Dhaka during the study period included in the study.
2. Exclusion criteria: Unwilling to participate, did not give consent to participate in an interview.

RESULTS

Regarding age distribution of the respondents it was found that out of 305 respondents majority (33.1%) were in the age group of 50+ years, 26.2% were 30-39 years, 23.05 were 20-29 years, 12.55 were 40-49 years and 5.2% were up to 20 years. The mean age of the respondents was 41.12 ± 16.148 years. Regarding monthly family income it was observed that 67.9% had 15001-30000 taka as monthly family income and 32.1% of the respondents had up to 15000 taka as monthly family income. The mean monthly family income of the respondents was 1784.25 ± 3395.589 Taka. It was found that 56.4% of the respondents were <40 Kg, 39.7% were 40-49 Kg and 3.9% were 50-59 Kg of body weight. The mean body weight of the respondents was 38.13 ± 6.037 Kg. Regarding height in cm it was observed that most (56.7%) of the respondents were <145 cm, 32.5% were 145-154 cm, 7.9% were 165-174 cm, 2.0% were 175+ cm and 1.0% were 155-164 cm in height. The mean height of the respondents was 145.06 ± 9.740 cm. Most (52.1%) of the respondents' smoked for more than 16 years, 25.7% smoked for 11-15 years and 22.1% smoked for 5-10 years. The mean year for smoking of the respondents was 18.49 ± 7.811 years. Most (77.4%) of the respondents' were illiterate, 18.7% had up to class V level of education and 3.9% had class VI-XII level of education. Most (83.3%) of the respondents' spouse were illiterate, 10.8% had up to class V

level of education, 4.6% had class VI-XII level of education and 1.3% were graduate plus. It was revealed that most (29.2%) of the respondents' were house wife, 28.2% were day labor, 21.0% were farmer, 10.2% were in others profession, 6.9% were in business and 4.6% were in service. It was found that majority (53.8%) of the respondents' did not use sanitary latrine and 46.2% used sanitary latrine. It was found that majority (59.7%) of the respondents' suffer from TB for 6 months, 36.7% for 1 year and 3.6% were for 2 years. It was found that majority (90.2%) of the respondents' had pulmonary TB and 9.8% had extra pulmonary TB. It was found that majority (89.8%) of the respondents' investigated sputum, 9.8% did their X-ray and 0.3% investigated both X-ray and sputum. It was found that majorities (90.2%) of the respondents' had yellow sputum and 9.8% had white color sputum. It was revealed that majority (40.3%) of the respondents' took their drug for 6 months, 31.8% took for 8 months and 27.9% took for 4 months. It was found that majority (82.3%) of the respondents' took their treatment irregularly and 17.7% took regular treatment. It was found that majority (70.8%) of the respondents' laps their treatment after 6 months, 24.3% laps after 8 months and 4.9% laps after 4 months. It was found that majority (55.7%) of the respondents' failed their treatment after 8 months, 42.3% failed after 6 months and 2.0% failed after 4 months. It was found that majority (80.3%) of the respondents' did not have any TB patient at home and 19.7% had one TB patient. It was found that majority (31.7%) of the respondents' found father as suffering person, 23.3% found as grandfather, 10.0% found as grandmother, 6.75 found as mother in law and 1.7% found as mother for the relation of TB. It was found that majority (96.7%) of the respondents' used first line drug and 3.3% used 2nd line drug. It was found that majority (94.8%) of the respondents' received 2nd line treatment pattern and 5.2% received 3rd line treatment. It was found that majority (89.2%) of the respondents' received current treatment for 9 months and 10.8% received for more than 9 months. The relationship between age, sex and weight of the respondents was statistically significant with type of TB (Table-1).

Table no. 01: Distribution of the respondents with different socio-demographic variables.

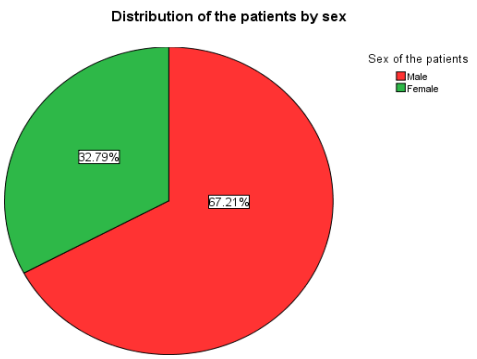
Variables		Frequency	Percentage
Age in group $\bar{X}$ ± SD = 41.12 ± 16.148 years	<20 years	16	5.2
	20 - 29 years	70	23.0
	30 - 39 years	80	26.2
	40 - 49 years	38	12.5
	50+ years	101	33.1
Monthly family income	BDT up to 15000	98	32.1

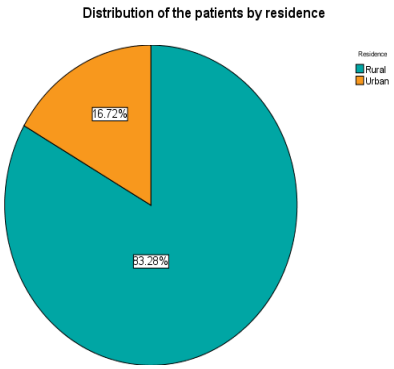
X ± SD = 1784.25 ± 3395.589 Taka	BDT 15001 - 30000	207	67.9
Weight in kg X ± SD = 38.13 ± 6.037 Kg	<40 kg	172	56.4
	40 - 49 kg	121	39.7
	50 - 59 kg	12	3.9
Height in cm X ± SD = 145.06 ± 9.740 cm	<145 cm	173	56.7
	145 - 154 cm	99	32.5
	155 - 164 cm	3	1.0
	165 - 174 cm	24	7.9
	175+ cm	6	2.0
Duration of smoking X ± SD = 18.49 ± 7.811 years	5 - 10 years	31	22.1
	11 - 15 years	36	25.7
	16+ years	73	52.1
Educational status of patient	Illiterate	236	77.4
	Up to class V	57	18.7
	Class VI-XII	12	3.9
Education status of spouse	Illiterate	254	83.3
	Up to class V	33	10.8
	Class VI-XII	14	4.6
	Graduate plus	4	1.3
Occupation	Farmer	64	21.0
	Service	14	4.6
	Business	21	6.9
	Day labor/Aya/Mid servant	86	28.2
	Others	31	10.2
	Housewife	89	29.2
Type of latrine used	Sanitary	141	46.2
	Non sanitary	164	53.8
Duration of suffering from TB	6 month	182	59.7
	1 year	112	36.7
	2 year	11	3.6
Type of TB	Pulmonary TB	275	90.2
	Extra pulmonary TB	30	9.8
Types of investigation done	X-ray	30	9.8
	Sputum	274	89.8
	Both (X-ray and Sputum)	1	0.3
Color of sputum	White	30	9.8
	Yellow	275	90.2
Duration of treatment taken	4 months	85	27.9
	6 months	123	40.3
	8 months	97	31.8
Type of treatment taken	Regular	54	17.7
	Irregular	251	82.3
Treatment laps period	After 4 months	15	4.9
	After 6 months	216	70.8
	After 8 months	74	24.3

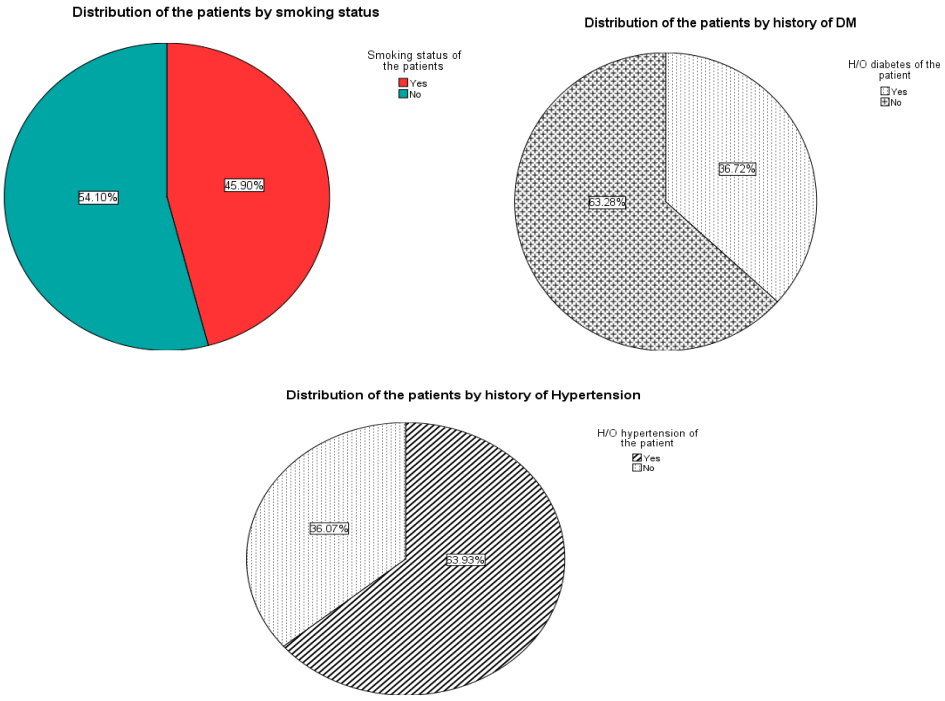
Time of treatment failure	After 4 months	6	2.0
	After 6 months	129	42.3
	After 8 months	170	55.7
No. of TB patient at home	One	60	19.7
	No	245	80.3
Relation of the suffering person	Father	19	31.7
	Mother	1	1.7
	Brother	4	6.7
	Sister	6	10.0
	Grand Father	14	23.3
	Grand Mother	6	10.0
	Mother in Law	4	6.7
	Others (uncle, causing etc.)	6	10.0
Kinds of drug used	First line	295	96.7
	2nd line	10	3.3
Current treatment pattern	2nd line	289	94.8
	3rd line	16	5.2
Current treatment duration	9 months	272	89.2
	More	33	10.8

Table no. 2: Relationship between age, weight in Kg, sex of the Respondents and Type of TB suffering from.

Age of the respondents	Type of TB suffering from		p-value
	Pulmonary TB	Extra pulmonary TB	
<20 years	8 (50.0%)	8 (50.0%)	0.01
20 - 29 years	48 (68.6%)	22 (31.4%)	
30 - 39 years	80 (100.0%)	0 (0.0%)	
40 - 49 years	38 (100.0%)	0 (0.0%)	
50+ years	101 (100.0%)	0 (0.0%)	
Weight in Kg			0.01
<40 kg	149 (86.6%)	23 (13.4%)	
40 - 49 kg	117 (96.7%)	4 (3.3%)	
50 - 59 kg	9 (75.0%)	3 (25.0%)	
Sex			0.01
Male	193 (94.1%)	12 (5.9%)	
Female	82 (82.0%)	18 (18.0%)	







It was found that most (67.21%) the respondents were male, 83.28% of the respondents were rural, 54.10% of the respondents did not have history of smoking, 63.28% of the respondents did not have history of DM, and 63.93% of the respondents had history of HTN (Figure-1-5).

DISCUSSION

Multidrug resistance is more commonly reported among previously treated tuberculosis patients than in new tuberculosis patients, globally as well as in Bangladesh.[1] Regarding age distribution of the respondents it was found that out of 305 respondents' majority (33.1%) was in the age group of 50+ years. Other studies conducted in Shanghai and Spain found that the greatest risk of MDR-TB was associated with age 35 to 59[11] and 45 to 65 years[12] respectively. Regarding monthly family income it was observed that 67.9% had 15001-30000 BDT as monthly family income and 32.1% of the respondents had up to 15000 BDT as monthly family income. Similar findings was found in another study.[17] Most (52.1%) of the respondents' smoked for more than 16 years, 25.7% smoked for 11-15 years and 22.1% smoked for 5-10 years. MDR-TB patients were more likely to be past tobacco smokers in our study. Smoking is one of the main determinants for TB and some studies showed an association with acquired drug resistance.[13] Another study showed that smoking is a predictor for delayed response to treatment.[18] Most (77.4%) of the respondents' were illiterate, 18.7% had up to class V level of education and 3.9% had class VI-XII level of education. A good number (83.3%) of the respondents' spouse were illiterate, 10.8% had up

to class V level of education, 4.6% had class VI-XII level of education and 1.3% were graduate plus. It was revealed that most (29.2%) of the respondents' were house wife, 28.2% were day labor, 21.0% were farmer, 10.2% were in others profession, 6.9% were in business and 4.6% were in service. It was found that majority (53.8%) of the respondents' did not use sanitary latrine and 46.2% used sanitary latrine. Occupation as transport workers, another highly mobile group, was associated with MDR-TB if examined alone, although we did not observe any difference after adjusting for other factors.[17] It was found that majority (59.7%) of the respondents' suffer from TB for 6 months, 36.7% for 1 year and 3.6% were for 2 years. It was found that majority (90.2%) of the respondents' had pulmonary TB and 9.8% had extra pulmonary TB. It was found that majority (89.8%) of the respondents' investigated sputum, 9.8% did their X-ray and 0.3% investigated both X-ray and sputum. It was revealed that majority (40.3%) of the respondents' took their drug for 6 months, 31.8% took for 8 months and 27.9% took for 4 months. It was found that majority (82.3%) of the respondents' took their treatment irregularly and 17.7% took regular treatment. It was found that majority (70.8%) of the respondents' laps their treatment after 6 months, 24.3% laps after 8 months and 4.9% laps after 4 months. It was found that majority (55.7%) of the respondents' failed their treatment after 8 months, 42.3% failed after 6 months and 2.0% failed after 4 months. In another study only five (2%) MDR-TB patients did not have any history of previous treatment, in line with the low level of primary resistance in a recent drug resistance survey.[17] It was found that majority (80.3%) of the respondents' did not have any TB patient at home and 19.7% had one TB patient. It was found that majority (31.7%) of the respondents' found father as suffering person, 23.3% found as grandfather, 10.0% found as grandmother, 6.7% found as mother in law and 1.7% found as mother for the relation of TB, in line with other studies.[4-8] It was found that majority (96.7%) of the respondents' used first line drug and 3.3% used 2nd line drug. It was found that majority (94.8%) of the respondents' received 2nd line treatment pattern and 5.2% received 3rd line treatment. It was found that majority (89.2%) of the respondents' received current treatment for 9 months and 10.8% received for more than 9 months. In a systematic review of risk factors conducted in Europe, previous treatment history of TB was the strongest determinant of MDR-TB in Europe and the pooled risk of MDR-TB was 10.23 times higher in previously treated patients than in patients without prior treatment.[5] It was found that most (67.21%) the respondents were male, 83.28% of the respondents were rural, 54.10% of the respondents did not have history of smoking, 63.28% of the respondents did not have history of DM, and 63.93% of the respondents had history of HTN. Males were more likely to have MDR-TB than females in

some settings[5] whereas the opposite was true in others.[4,9] Type 2 Diabetes is known to be a risk factor for TB[19] and is linked to MDR-TB in other studies.[14] The relationship between age, sex and weight of the respondents was statistically significant with type of TB. This study did not show any association with health care as an occupation, which was found to be associated with MDR-TB in another study.[10]

CONCLUSION

Management of MDR-TB is a face up to which should be undertaken by skilled clinicians at centres equipped with trustworthy laboratory service for mycobacterial culture as it requires prolonged use of expensive second-line drugs with a significant potential for toxicity. Sensible use of drugs, supervised individualized treatment, paying attention clinical, radiological and bacteriological follow up are key factors in the successful management of these patients. In certain areas, at present available programme approach may not be enough and pioneering approaches such as DOTS-plus may have to be employed to effectively control MDR-TB.

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