

Evaluation of New and Previous Cases of Multi Drug Resistant Tuberculosis from a Tertiary Care Level Hospital in Dhaka City

Dr. Ismot Ara¹, Dr. Sharmin Ahmed Tithy², Dr. Abu Muhammad Abdullah Pervej³, Dr. Kaniz Afrin⁴, Dr. Hassnul Alam⁵, Dr. Taj Uddin Ahmed⁶, Dr. Md. Sumsuzzaman⁷, Dr. Nazia Azim⁸

¹Lecturer, Department of Community Medicine, Shaheed Suhrawardy Medical College and Hospital, Dhaka, Bangladesh.

²Medical Officer, Civil Surgeon Office, Dhaka, Bangladesh

³Junior Consultant, Department of Anesthesia, National Institute of Traumatology and Orthopaedic Rehabilitation (NITOR), Dhaka, Bangladesh

⁴Assistant Professor, Department of Anaesthesia, Analgesia and Intensive Care Medicine, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka, Bangladesh

⁵Assistant Professor, Department of Anaesthesia, Analgesia and Intensive Care Medicine, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka, Bangladesh

⁶Assistant Professor, Department of Anaesthesia, Analgesia and Intensive Care Medicine, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka, Bangladesh

⁷Assistant Professor, Department of Anaesthesia, Analgesia and Intensive Care Medicine, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka, Bangladesh

⁸Anaesthesiologist, Delta Health Care, Jatrabari, Dhaka, Bangladesh

Corresponding Author: Dr. Ismot Ara, Lecturer, Department of Community Medicine, Shaheed Suhrawardy Medical College and Hospital, Dhaka, Bangladesh.

Abstract: Alarming amount of reports from various parts of the world are coming in concern about increasing multidrug resistant tuberculosis (MDR-TB). Treatment options for which are limited and expensive, prescribed medicines are not always available, additionally the concomitant adverse effects of the drugs are almost inevitable. Thus, frequent research for the factors linked with multidrug resistant TB should be carried out to understand its prevalence and mechanism of spread. The present study observed 200 MDR-TB patients and observed their socio-economic and other factors. With a cross sectional study design, this study has been conducted in the National Institute of Disease of the Chest and Hospital during the period of January to December of the year 2019. After availing the ethical approval for the study and informed written consent from the patients, face to face interview has been carried out with a standardized semi-structured questionnaire. Age, occupation, marital status, monthly family income, living area, smoking status and suffering from diabetes found to be significantly associated with the MDR-TB status of the patients ($p < 0.05$). These study findings recommend to undertake further study to evaluate the predominant risk factor for better understanding of other prospective predictors of MDR-TB.

Keywords: Tuberculosis, Multi drug resistant tuberculosis, Diabetes, Smoking

I. Introduction

Increased concern is growing regarding the multidrug resistant tuberculosis (MDR-TB) and its management. MDR-TB is increasingly emerging as a serious public health threat, which is impeding the achievement of successful TB control. ¹ MDR-TB is tubercular infections, that are resistant to the first line anti-TB drugs. It is caused by tubercular bacteria that is non-responsive to isoniazid and/or rifampin, which are prescribed for all TB patients on the first hand. ² Bangladesh's mortality rate of TB is 51 per 100,000 population. ³ World Health Organization ranked Bangladesh 6th among the world's 22 high TB burden countries and 9th among 25 high MDR and extensively drug resistant (XDR) TB countries. ⁴ MDR was significantly higher among the patients with history of anti-TB treatment previously. A systematic review study has observed that, MDR-TB was 10.23 times higher in previously treated patients than in patients without prior treatment. ⁵ The prevalence of MDR-TB in previously treated patients found to be 1.4 percent in new patients and 29% in previously treated patients. ³ A recent estimation made by WHO showed approximately 2.2% of new and 14.7% of previously treated patients suffer from MDR TB in Bangladesh. ³ Study findings revealed that, in Bangladesh, tuberculosis isolates

were resistant to at least one of the first line anti-TB drugs in 48.4% cases, while multidrug resistance was observed in 5.5% of isolates. ⁶

Lengthy and costly treatment procedures recovering from multidrug resistant tuberculosis is often remain very challenging. ⁷ Factors thought to be responsible for the development drug resistant TB includes inadequacy in the prescribed regimen, a failure to diagnose pre-existing resistance, undetected reduced bioavailability of drugs, non-adherence and poor compliance to the prescribed regimen etc. ⁸ Comorbid conditions which increase the risk of MDR-TB, among them diabetes mellitus and HIV infections are the common ones. ^{9,10} Additionally, aged between 18 and 45 years found to be associated with an increased risk for MDR-TB. ¹¹

The level of drug resistance and the extent of resistant bacteria in a community is indicative of the success rate of the enforced tubercular program. ¹² In Bangladesh the precise rate of MDR-TB is unrevealed due to lack of data regarding the prevalence as well as the resistant strain existent here. Assessing the precipitating factors are of crucial importance to prevent and manage the increasing trend of MDR-TB. This study aims to evaluate the background factors linked with MDR-TB among the patients from a tertiary care level hospital in Dhaka city.

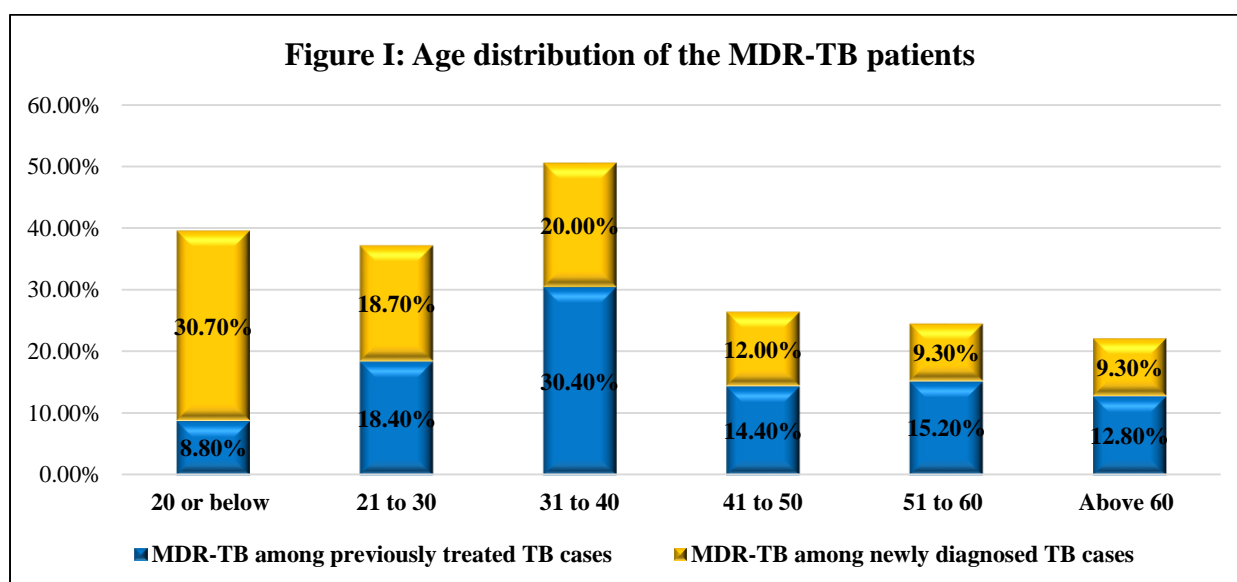
II. Methodology

Subjects and methods: With a cross sectional study design, the present study has been conducted in the National Institute of Disease of the Chest and Hospital during the period of January to December of the year 2019. Subsequent to attainment of the ethical clearance for the study to be conducted, diagnosed cases of MDR-TB attending the respective hospital, has been purposively selected and approached. After considering for the selection criteria of the study, 200 patients were enrolled as the study sample after availing their informed written consent.

Selection criteria: Patients with diagnosed and registered MDR-TB who were on treatment during the study period, has been selected from the respective hospital.

Data Collection and Processing: To collect data, face to face interview has been carried out with a standardized semi-structured questionnaire. Alongside, the medical records of the patients have been reviewed. Data regarding sociodemographic background, diabetic and smoking status has been collected and recorded. Collected data were edited and analyzed using IBM Software-Statistical package for Social Science (SPSS), version 22. Frequency and percentages has been depicted for qualitative data and mean and standard deviation has been calculated for quantitative data.

III. Result



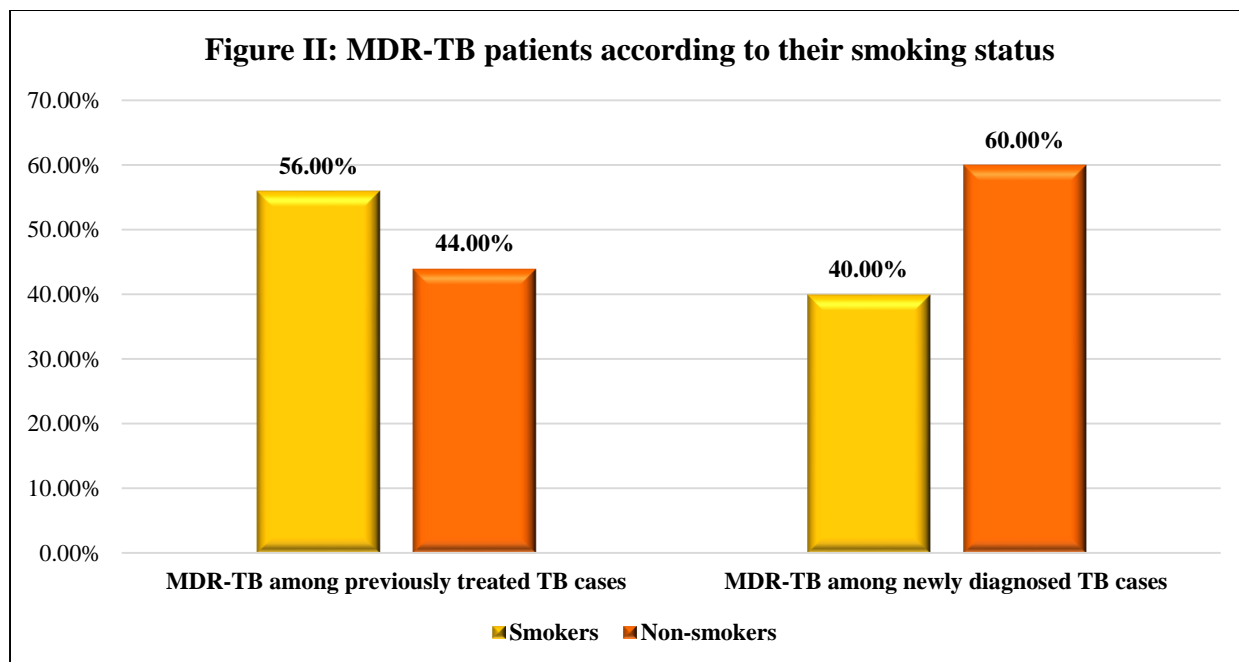
Among the 200 MDR TB cases under this study, 125 cases were among previously treated TB (62.5%) cases and 25 cases were among newly diagnosed TB cases (37.5%). Among the previously treated TB cases highest percentage (30.4%) of them were aged between 31 to 40 years, whereas, among the newly diagnosed TB cases highest percentage (30.7%) of them were aged 20 years or below (Figure I). The mean age of the MDR-TB cases among previously treated TB cases were 41.32 ± 15.48 years and among newly diagnosed TB cases were 34.92 ± 17.6 years. The proportion of male and female patients among the two groups were nearly similar, there was 64.8% male and 35.2% female in the previously treated TB cases and 61.3% male and 38.7% female in the

newly diagnosed TB cases. Proportion of illiteracy was higher among the previously treated TB cases (25.6%) compared to newly diagnosed TB cases (17.3%), whereas, proportion of graduate respondents were lower among previously treated TB cases (11.2%) compared to newly diagnosed TB cases (13.3%). Respondents who were not linked with any income generation, that is being, unemployed, retired or being housewives (4.0%, 3.2% and 23.2% respectively, a total 30.4%) were more in proportion in previously treated TB cases compared to in newly diagnosed TB cases (1.3%, 5.3% and 18.7% respectively, a total 26.0%). In the previously treated TB cases 81.6% of them were married and in the newly diagnosed TB cases the married respondents were 64.0%. Among the previously treated TB cases nearly half of them (49.6%) were gave history of a monthly income of 15000 taka or below, 37.6% of them had a monthly income of more than 15000 to 30000 taka and 12.8% of them had a monthly income of more than 30000 taka.

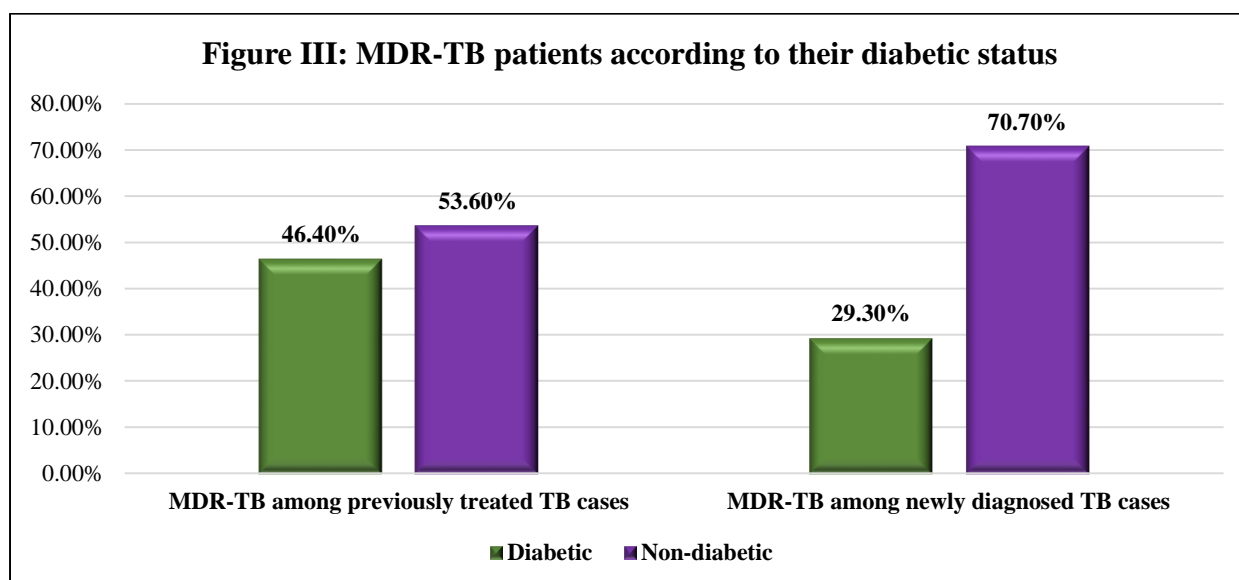
Table I: Background characteristics of MDR-TB patients

		MDR-TB among previously treated TB cases (n ₁ =125)		MDR-TB among newly diagnosed TB cases (n ₂ = 75)		p value
		N	%	N	%	
Sex	Male	81	64.8%	46	61.3%	0.62
	Female	44	35.2%	29	38.7%	
Educational status	No formal education	32	25.6%	13	17.3%	0.5
	Primary	17	13.6%	8	10.7%	
	SSC	42	33.6%	33	44.0%	
	HSC	20	16.0%	11	14.7%	
	Graduation	14	11.2%	10	13.3%	
Occupational status	Unemployed	5	4.0%	1	1.3%	0.006
	Service	28	22.4%	18	24.0%	
	Business	38	30.4%	13	17.3%	
	Day Labor	11	8.8%	4	5.3%	
	Retired	4	3.2%	4	5.3%	
	Housewife	29	23.2%	14	18.7%	
	Others	10	8.0%	21	28.0%	
Marital status	Unmarried	16	12.8%	24	32.0%	0.008
	Married	102	81.6%	48	64.0%	
	Divorced	2	1.6%	0	0.0%	
	Widowed	5	4.0%	3	4.0%	
Monthly family income (taka)	15000 or below	62	49.6%	29	38.7%	0.04
	Above 15000 to 30000	47	37.6%	41	54.7%	
	Above 30000	16	12.8%	5	6.7%	
Living area	Urban	39	31.2%	35	46.7%	0.02
	Rural	86	68.8%	40	53.3%	
Type of family	Nuclear	61	48.8%	46	61.3%	0.08
	Joint	64	51.2%	29	38.7%	
Number of family members	2-5	45	(36.0%)	35	(46.7%)	0.25
	6-8	61	(48.8%)	28	(37.3%)	
	9-12	19	(15.2%)	12	(16.0%)	

Among the newly diagnosed TB cases 38.7% had a monthly income of 15000 taka or less, 54.7% of them had a monthly income of more than 15000 to 30000 taka and 6.7% of them had a monthly income of more than 30000 taka. Regarding the residence of the respondents, 68.8% of the previously treated TB cases and 53.3% of the newly diagnosed TB cases lived in rural areas. Regarding the type of family structure, 48.8% of the previously treated TB cases and 61.3% of the newly diagnosed TB cases lived in a nuclear family. For previously treated TB cases highest fraction of them (48.8%) had 6 to 8 family member and for newly diagnosed TB cases highest fraction of them (46.7%) had 2 to 5 family members.



Among previously treated TB cases 56.0% and among newly diagnosed TB cases 40.0% gave history of smoking (Figure II). Diabetes mellitus was present in 46.4% of previously treated TB cases and 29.3% of the newly diagnosed TB cases (Figure III).



Among these characteristics, age, occupation, marital status, monthly family income, living area, smoking status and suffering from diabetes found to be significantly associated with the MDR-TB status of the patients ($p < 0.05$).

IV. Discussion

The present study compared some background factors among the MDR-TB cases who were previously treated for TB and who were newly diagnosed with TB. The present study recorded 62.5% of MDR-TB among previously treated TB cases and 37.5% of MDR-TB among newly diagnosed TB cases. According to World Health Organization, in Bangladesh, MDR-TB is estimated to be prevalent among 29% of previously treated tuberculosis and 1.4% of newly diagnosed tuberculosis patients.³ MDR-TB among previously treated TB cases may be the result of non-adherence or non-compliance to previous treatment or may be due to selection of resistant strains by previous anti-tubercular treatment although the mechanism of MDR-TB in newly diagnosed cases may be related to existent TB control programme.¹³ In this study, it has been found that, age, occupation, marital status, monthly family income, living area, smoking status and suffering from diabetes was significantly associated with the MDR-TB status of the patients. It has been seen that, MDR-TB in newly diagnosed TB cases

was significantly younger in age (34.92 ± 17.6 years) than the MDR-TB cases with previously treated TB cases (41.32 ± 15.48 years) ($p < 0.05$). In another study conducted in Hong Kong by Law et al., they saw that, MDR-TB cases among no previous history of anti-tubercular treatment had less mean of age than that of the MDR-TB cases among previous history of anti-tubercular treatment.¹³ Younger people are more likely to come in contact with MDR-TB as they are more mobile and active compared to the older age group through their involvement in work or study. In the study by Gobena et al. in Ethiopia, they found that, the majority of MDR-TB respondents were from the age group of 25 to 34 years, 39.0% of the cases were illiterate, 58.0% of cases were urban dwellers, one third of respondents had no regular income, 23.7% were smokers and 13.6% had diabetes.¹⁴ Diabetes as a comorbid condition found to be prevalent significantly more in previously treated TB patients having MDR-TB than the newly diagnosed TB patients with MDR-TB. Study focusing on MDR-TB among newly diagnosed TB cases found that, diabetes mellitus increases the risk of development of MDR-TB among newly diagnosed TB patients.¹⁵

V. Conclusion

Observing the background factors among both previously treated and newly diagnosed TB cases, this study and its findings extricates important aspects of factors related to MDR-TB. Age, occupation, marital status, monthly family income, living area, smoking status and suffering from diabetes was in significant association with the MDR-TB statuses. Further study to evaluate the predominant risk factor for better understanding of other prospective predictors of MDR-TB is recommended to be undertaken.

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