

Profile of MDR-TB Patients Admitted in a Tertiary Level Hospital in Bangladesh

Nasima Begum¹, Md. Mostaque Hossain Ansari², Hasna Jahan³, Fahima Akhter⁴

¹Department of Community Medicine, Sir Salimullah Medical College, Mitford Road, Dhaka 1100, Bangladesh.

²Department of Community Medicine, Army Medical College, Bogra Cantonment, Bogra, Bangladesh.

³Department of Community Medicine, Army Medical College, Bogra Cantonment, Bogra, Bangladesh.

⁴College of Applied Medical Sciences, King Faisal University, Hofuf, Al Ahsa 31982, Saudi Arabia.

Abstract: Tuberculosis is a global problem and drug resistant tuberculosis enhances this problem remarkably. A lot of patients in Bangladesh are also infected with MDR TB bacilli. This descriptive study was carried out in July 2009 to 2010 among 200 patients admitted into NIDCH, Mohakhali, Dhaka, Bangladesh during this study period. Census type of sampling design was followed to assess the distribution of the cases. Semi-structured pre tested questionnaire was used to collect data. SPSS computer software was used for data entry, analysis and interpretation. Out of 200 MDR patients, the large number (42%) was belonged to 20-30 years age group; male patients (62%) were more than female. Large section (44.0%) patients were from urban areas and almost similar proportion (40.5%) was smokers and one tenth of the patients gave the history of drug addiction. Considering their education, Secondary School Certificate (SSC) qualification holders were the larger group (36%) and 20% were service holder. Majority of the patients (52.0%) had previous complete treatment history and a great number (69.5%) had no history of treatment interruption.

Keywords: Mycobacterium tuberculosis, multi-drug resistance, TB patients, pulmonary tuberculosis.

1. Introduction

Tuberculosis is among the leading causes of death worldwide [1]. It has been declared a global emergency by the World Health Organization (WHO) and is the most important communicable disease worldwide [2].

The World Health Organization (WHO) estimates that 32% of the world population is infected with *Mycobacterium tuberculosis*, the causative agent of TB [3]. Approximately one third of the world population is infected and about three millions die each year from this disease [2]. It remains the principal cause of death in the developing countries, probably due to poverty, lack of education, low detection rate, non-availability of experienced staff and insufficient coverage of the community by immunization programme [4].

Drug resistance to isoniazid and rifampicin, the two most potent first-line drugs for the treatment of TB which is the definition for MDR, is increasing globally [5]. Surveillance data indicate MDR TB is an emerging global problem, especially in countries of the former Soviet Union (FSU), Israel, and areas of the People's Republic of China [1]. Tuberculosis (TB) remains to be one of the most common problems affecting patients in developing countries [6].

Since active TB will develop in only a proportion of persons infected with *M. tuberculosis* directly after primary infection, the prevalence of MDR TB may still be underestimated [1]. Furthermore, strains of *M. tuberculosis* that are resistant to second-line drugs are also emerging. In vitro drug resistance of *M. tuberculosis* to any fluoroquinolone and to at least one of

the injectable drugs like capreomycin, kanamycin, or amikacin, in addition to isoniazid and rifampicin resistance, is defined as XDR TB [7]. Strains of XDR TB have now been isolated from patients in >45 nations worldwide and they are associated with worse treatment outcomes than strains of MDR TB [1].

Strains of XDR TB are increasingly seen in HIV-seropositive persons with TB in southern Africa, where these strains are passed by person-to-person contact. XDR TB has become a serious problem for the health administrations in this region [8]. In contrast, infections with XDR TB strains are rarely seen in Western Europe, mainly among the population of pretreated migrants from countries of the FSU [9].

Drug-resistant tuberculosis is still ubiquitous and alarmingly high in several countries. The situation is further complicated by the emergence of multi-drug tuberculosis (MDR-TB). MDR-TB results from improper administration of antibiotics in chemotherapies of TB patients and is recognized as *Mycobacterium tuberculosis* resistant to at least isoniazid and rifampicin, the two most common first-line anti-tuberculosis drugs [10]. Anti-mycobacterial susceptibility testing requires an additional two weeks before reports are issued. Overall, the prevalence of initial drug resistance among adults in India is about 20-30% for Isoniazid and 2-3% for Rifampicin [11]. However, in patients with acquired resistance i.e. those who have had chemotherapy in the past, the rates of drug resistance are much higher i.e. 50-60% for INH, 20-30% for Rifampicin and 15-30% for Streptomycin [11]. The main reasons for emergence of drug resistance are omission of one or more prescribed agents, suboptimal doses and poor drug absorption.

Anti TB drugs are also freely available in the market, which leads to self-treatment and improper regimens [11].

2. Methodology

This descriptive, cross-sectional study was carried out in the National Institute of Diseases of Chest and Hospital Mohakhali, Dhaka a referral level specialized hospital which manages MDR-TB patients who come from different parts of Bangladesh. This study was conducted from July 2009 to June 2010. Persons who were diagnosed as MDR TB patients and admitted in this hospital were considered as case group in this study. Census type of sampling design was followed and a total 200 patients were included. Semi-structured pre tested questionnaire was used to collect data. The SPSS computer software was used for data entry, analysis and interpretation of the result.

3. Results

Tables and figures have been used for presenting the results. **Table 1** shows the distribution of the patients by age, sex, marital status, education, occupation, smoking habit and drug addiction. Considering the age, among 200 patients 84 were in 20-30 years age group that are major in number and less number patients (10) were in >60 year age group. **Figure 1** shows the bar diagram where the frequency distribution reflects the same result. Considering the educational status, **Table 1** also shows that majority patients were passed SSC level which is 72 (36.0%) cases followed by illiteracy and primary level; both of which is 52 (26.0%) cases. Both HSC and undergraduate and above are in 12 (6.0%) cases. **Figure 2** also reflects this result where most of the patients (36%) passed SSC and higher secondary level; patients number in undergrads and above are less (6% each). **Table 2** shows the Socio-economic parameters of the MDR patients. Considering their housing condition, the patients who mostly live in kaccha house is 92 (46.0%) in number followed by Pacca and Semi pacca which are in 64 (32.0%) and 44 (22.0%) cases respectively. Pie chart in **Figure 3** reflects the result of this distribution according to their housing condition. **Table 3** shows the incidence of patient in their previous treatment history. Among 200 patients, 104 (52%) cases had given the history of completing the courses of treatment and the rest 96 (48%) cases had given incomplete treatment course. Regarding the interruption of the treatment 139 (69.5%) cases had taken previous treatment uninterruptedly and the remaining 61 (30.5%) patient had taken their treatment with interruption.

Table 1: Demographic parameters of the MDR TB patients

Parameter	Characteristics	Frequency	Percent
1. Age (in year)	< 20	34	17.0
	20-30	84	42.0
	30-40	32	16.0
	40-50	20	10.0
	50-60	20	10.0
	>60	10	5.0
	Total	200	100.0
2. Sex	Male	124	62
	Female	76	38
	Total	200	100.0

3. Marital status	Married	136	68.0
	Unmarried	59	29.5
	Widow	3	1.5
	Divorced	2	1.0
	Total	200	100.0
4. Education	Illiterate	52	26
	Primary	52	26
	SSC	72	36
	HSC	12	6
	Degree and above	12	6
	Total	200	100.0
5. Occupation	Service	40	20
	Farmer	32	16
	Day laborer	32	16
	Business	24	12
	House Wife	32	16
	Others	40	20
	Total	200	100.0
6. Smoking Habit	Yes	81	40.5
	No	119	59.5
	Total	200	100.0
7. Drug Addiction	Yes	20	10
	Alcohol	5	2.5
	Ganja	12	6
	Heroin	3	1.5
	No	180	90
	Total	200	100.0

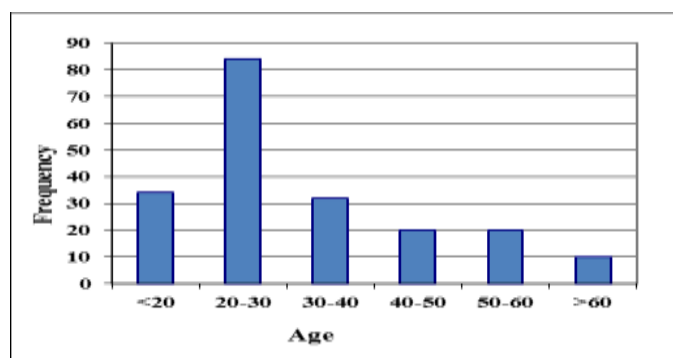


Figure 1: Bar diagram to show the distribution of the respondents according to their age

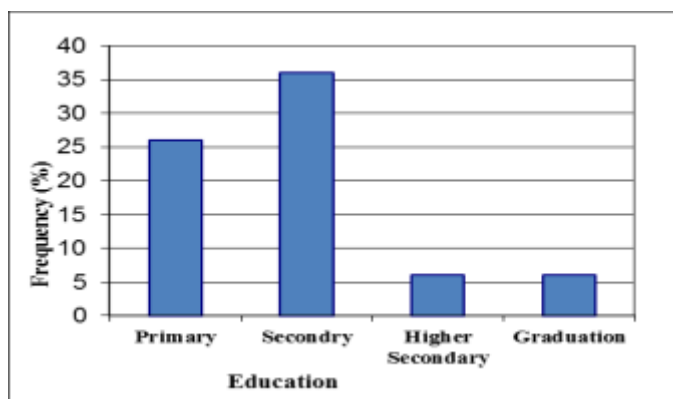
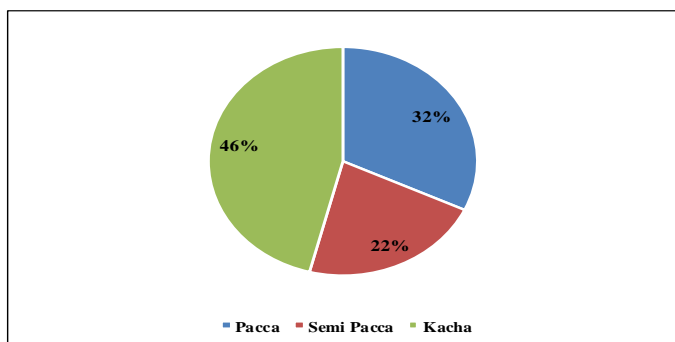


Figure 2: Bar diagram to show distribution of the respondents according to their education

Table 2: Socio- economic parameters of MDR TB patients

Parameter	Characteristics	Frequency	Percent
1. Housing condition	Pacca	64	32
	Semi pacca	44	22
	Kaccha	92	46
	Total	200	100.0
2. Locality	Urban	88	44
	Rural	68	34
	Peri urban	40	20
	Slum	4	2
	Total	200	100.0
3. Famiy type	Nuclear	159	79.5
	Joint	41	20.5
	Total	200	100.0

**Figure 3:** Pie chart to show the distribution of the respondents according to their housing condition**Table 3:** Incidence of patient in previous treatment history

	Characteristics	Frequency	Percent
➤	Previous treatment		
	Complete treatment	104	52.0
	Not complete	96	48.0
➤	Previous interrupted treatment		
	No	139	69.5
	Yes	61	30.5
	Total	200	100.0

4. Discussions

The definition for MDR is the drug resistance to isoniazid and rifampin which are the two most potent first-line drugs for the treatment of TB and is increasing globally [5]. There were an estimated 9.2 million new TB cases and 1.7 million deaths from TB in 2006 [12]. It has been declared a global emergency by the WHO and is the most important communicable disease worldwide. Approximately one third of the world population is infected and about three millions die each year from this disease [2]. It remains the principal cause of death in the developing countries, probably due to poverty, lack of education, low detection rate, non-availability of experienced staff and insufficient coverage of the community by immunization program [4]. Drug-resistant TB strains have emerged following the inappropriate use of anti TB drugs [2].

A total number of 200 MDR TB patients were registered in this study who admitted at the indoor department in the National Institute of Diseases of Chest and Hospital, Mohakhali, Dhaka, Bangladesh (NIDCH). The distribution of the patients by age was observed in this study. Among 200 patients the majority were from the age group of 20-30 years which was 84 in number (42.0%) followed by <20 years, 30-40 years which was 34 (17.0 %) and 32 (16.0%) in number respectively. In both

40-50 years and 50-60 years age groups 20 (10.0%) cases were found. The only 10 (5.0%) cases were present in more than 60 years age group. The mean age of the study population was 33.57 years with a range of 10-70 years.

Similar result was found by Khan in Bangladesh and he mentioned that the majority of the patients are in this age group [13]. Ansari et al reported that those younger age groups were mostly affected by pulmonary tuberculosis [14]. This result is consistent with this study.

The distribution of the patients according to sex was observed in this study. Among 200 MDR TB patients male was predominant than female which was 124 (62.0%) and 76 (38.0%) respectively. The ratio between male and female was 1.6: 1. Similar finding was reported by Khan and he added that male was predominant in pulmonary tuberculosis [13]. Ansari et al was found a result which was consistent with this study and mentioned that the ratio of male and female was 2.4:1 [14]. In another study, Kamel et al showed a similar result [15]. In most countries, more cases of TB are reported among men than women [16]. This difference is partly due to the fact that women have less access to diagnostic facilities in some settings, but the broader pattern also reflects real epidemiological differences between men and women, both in exposure to infection and in susceptibility to disease.

The distribution of the patients by marital status was recorded. Among 200 patients almost all patients were married which is in 136 (68.0%) cases followed by unmarried, widower and divorced which is in 59 (29.5%), 3 (1.5%), and 2 (1%), respectively.

The distribution of the patients by educational status was observed. Majority patients were passed SSC level which is 72 (36.0%) cases followed by illiteracy and primary level; both of which is 52 (26.0%) cases. Both HSC and undergraduate and above are in 12 (6.0%) cases. The distribution of the patients by occupation is observed. Among 200 patients majority were service holder and in others profession which is 40 (20.0%) in each. 32 (16.0%) are found in each of farmer, day laborer and house wife. In business group 24 (12.0%) cases are found. The different epidemiological data are collected in this study. In the present study laborer are in a large vulnerable group who are mostly affected by pulmonary tuberculosis. The reason of this may be due to overcrowding in the working environment and malnutrition and these are the two important factors for the increased risk and incidence of TB in this age group [13]. The prevalence of pulmonary tuberculosis in garments worker is low as because most of them are women and women are less vulnerable to pulmonary tuberculosis [14].

The distribution of the patients addicted by smoking was observed in this study. Among 200 patients nonsmokers are in 119 (59.5%) cases and the rest 81 (40.5%) cases are smokers. The distribution of the patients addicted in any drug was observed. Among 200 patients only 20 (10%) cases are addicted in different types of drugs; the rest 180 (90%) cases are non-addicted.

The distribution of the patients by type of house was observed. Among the patients who mostly live in kaccha house is 92 (46.0%) in number followed by Pacca and Semi pacca which are 64 (32.0%) and 44 (22.0%), respectively. Similar results were reported by Barroso et al who mentioned that the association known for centuries between TB and poverty also applies to MDR-TB [17].

The distribution of the patients by locality was recorded. Among 200 patients mostly are from urban which are 88 (44.0%) in number followed by rural area, peri-urban and slum areas which is 68 (34.0%), 40 (20.0%) and 4 (2.0%) in number respectively. Similar result was found by Rivera et al and reported that the MDR resistance rates were not significantly different in urban and rural areas [18]. The distribution of the patients by type of family was observed. Nuclear family was predominant than joint family which is in 159 (79.5%) cases and 41 (20.5%) cases respectively.

The distribution of the patients who had completed the courses of treatment was observed. Among 200 patients 104 (52%) cases had given the history of completing the courses of treatment and the rest 96 (48%) cases had given incomplete treatment course. The distribution of the patients by interruption of treatment course was observed. Among 200 patients, 139 (69.5%) cases had taken uninterrupted treatment.

The causes of development of MDR TB are important to prevent this problem globally. In addition to studying the association of MDR-TB with previous treatments, it is equally important to investigate the quality of those treatments [19]. If a patient had previous treatment, even an adequate one it still represents a minimal risk for MDR-TB [20]. A treatment can be considered inadequate because it was discontinued too early or abandoned, or because it was made on an irregular basis [17]. Nunn and Felten mentioned treatments with insufficient duration as a cause of drug resistance; this is important, but irregular treatment is even worse [21]. If the treatment is irregular, the number of bacterial death and bacterial growth cycles will be greater, giving more opportunities for individual mutations of different independent genes to accumulate [17].

5. Conclusions

This was a descriptive type of cross-sectional study to assess distribution of multidrug-resistant Tuberculosis. It was found that most of the patients were younger age group having an average age of 33 years and majority of them were male of low socio-economic status. Majority of the patients received non-interrupted treatment and completed the treatment course before MDR status diagnosed. Non-completion of treatment was associated with smoking habit and drug addiction. This study permit to conclude that the distribution and cause of multi-drug resistant tuberculosis should be identified for the prevention of MDR TB.

6. Recommendations

The cases of MDR-TB are higher in developing counties, especially in Bangladesh. So, following recommendations are suggested on the basis of findings of this study.

- Special care should be given to younger MDR-TB patients.
- Improvement of the overall socioeconomic condition.
- Close monitoring of treatment of patients under directly observed treatment, short course (DOTS) should be strengthening.
- Relapse rate of MDR-TB patients is high. All cured patients of both TB and MDR-TB should be advised by the physicians to come back for follow up.

- Cause of drug-resistant in INH and Rifampicin should be identified and measure should be taken accordingly.
- Mandatory admission of MDR-TB patients in specialized hospital to prevent its spread.
- Dissemination of knowledge about the consequences of discontinuation of drugs and development of MDR-TB at all level of health workers and TB patients.

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Dr Md Mostaque Hossain Ansari received his MBBS (Bachelor of Medicine and Bachelor of Surgery) degree from Rajshahi University at Rajshahi Medical College in January 1982. He obtained DCM (Post Graduate Diploma in Community Medicine) from Dhaka University at NIPSOM (National Institute of Preventive and Social Medicine) and Ph D from Rajshahi University at Institute of Biological Science on

Occupational and Environmental Health. He started his professional carrier as Assistant surgeon (In-service Trainee doctor) at Rajshahi Medical College hospital for one year. Then he was posted at Upazila Health Complex [in rural area in Bangladesh] as Medical Officer (H & FP). He served at Grass root level health care for 11 years on the post of Medical Officer (Health) and Medical Officer (Mother and Child Health). Thereafter he served as Lecturer, Assistant Professor, Associate Professor and Professor of Community Medicine in different medical colleges of Bangladesh. He also served as senior lecturer, Public Health Medicine at Penang Medical College in Malaysia. Now he is working as Professor and Head of the department of Community Medicine at Army Medical College Bogra in Bangladesh. He is engaged in research since his teaching carrier and had published 146 research papers in National and International journals.



Dr. Hasna Jahan received her MBBS (Bachelor of Medicine and Bachelor of Surgery) degree from Rajshahi University at Rajshahi Medical College in 1995. She obtained Masters in Public Health (MPH) in Community Medicine from Bangabandhu Sheikh Mujib Medical University at NIPSOM (National Institute of Preventive and Social Medicine) in 2002 and DDV (Diploma in Dermatology and Venereology from BSMMU in

2010. She started her professional carrier as an Intern doctor at Rajshahi Medical College hospital. She also served as Assistant Professor of Community Medicine in TMSS medical college at Bogra and now is working as assistant Professor of Community Medicine at Army Medical College Bogra, Bangladesh. She is engaged in research since her teaching carrier and had published 4 research papers in National Journals.



Dr. Fahima Akhter received her MBBS (Bachelor of Medicine, Bachelor of Surgery) degree from Rajshahi Medical College, University of Rajshahi, Bangladesh in 1995. Then she started her professional career as an intern doctor at Rajshahi Medical College Hospital in Medicine, Surgery, Gynecology & Obstetrics and Pediatrics in indoor and outdoor departments. Later on, She served at an

International NGO and attended different training programs such as TOT, Leadership training, Tuberculosis management, and STD management training. Dr. Fahima obtained her M Phil in Anatomy from Bangabandhu Sheikh Mujib Medical University (BSMMU), Bangladesh in 2006. Currently she is a faculty member at King Faisal University, Saudi Arabia and under leave from Enam Medical College and Hospital, Bangladesh where she was the Professor of Anatomy. Prior to this, Dr. Fahima lent her teaching and research experiences at several Medical Colleges and Hospitals in Bangladesh, like LAMB Hospital and Kumudini Women's Medical College and Hospital. Her research work focused on gross morphological study on human placenta in Gestational Diabetes Mellitus (GDM) and Pregnancy Induced Hypertension (PIH) mothers. She is engaged in research since her teaching carrier and had published 6 research papers in National and International Journals. Her research interests include on Functional and Clinical Anatomy, Cell and Developmental Biology, Biological Anthropology, Neuro Science, Development and Regeneration, Morphometric and Histological Analysis of Human Organs, Reproductive Biology and so on.

Disclosure Statement

The authors declare no conflict of interest.

Authors Profile



Dr. Nasima Begum received her MBBS (Bachelor of Medicine and Bachelor of Surgery) degree from Dhaka University at Sir Salimullah Medical College in January 1992. She obtained MPH in Community Medicine from Bangabandhu Sheikh Mujib Medical University (BSMMU) at NIPSOM (National Institute of Preventive and Social Medicine) in 2002 and M Phil (PSM) in Preventive and Social Medicine from BSMMU at NIPSOM in 2010. She started her professional carrier as Intern doctor at SSMC Hospital. She joined in Public service in 2000 at Sheed Ziaur Rahman Medical College (SZMC) Bogra Bangladesh as lecturer of community medicine. Thereafter she served as Lecturer of Community Medicine in different medical colleges of Bangladesh. Now she is working on the same post at Sir Salimullah Medical College. She is engaged in research since her teaching carrier and had published 6 research papers in National medical Journals.