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A Study to Assess Socio Demographic Correlates of Multi Drug Resistant (MDR) TB Cases in A Tertiary Care Hospital of India

(ORIGINAL ARTICLE)

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Abstract

Background: *Tuberculosis has been a major cause of suffering and death since times immemorial, thought to be one of the oldest human diseases. Drug resistance is a threat to TB control programs worldwide. Patients infected with multiple-drug resistant strains are less likely to become cured. Therefore we planned this study to analyze the various socioeconomic correlates influencing development of drug resistance among MDR-TB patients*

Objective:

1. *To assess socio economic distribution of MDR cases reported at hospital*
2. *To find out various socio demographic correlates of MDR cases reported at hospital.*

Method: *It was a hospital based observational study. Informed consent of the patient was taken for the study. Approval from institutional ethical committee was obtained for the thesis. All information to accomplish objectives was collected by personal interview of each of the study subjects for about 30 to 45 minutes at PMDT site using pre-designed and pre-tested Proforma.*

Results: *There was a peak of admission of the patients in July month (n=60, 20.83%).Most of the patients (95.48%) belong to three districts namely Ajmer, Nagour and Bhilwara.MDR TB can affect all the age groups. In the study population, 214 (74.30%) patients were in the reproductive and economically productive age group of 16-45 years. One hundred and sixty patients (55.55%) had history of addiction and it was observed significant association of MDR TB with addiction habit.*

Keywords: *MDR cases; socio demographic correlates.*

Introduction

Tuberculosis has been a major cause of suffering and death since times immemorial, thought to be one of the oldest human diseases.[1] Tuberculosis, despite the availability of effective diagnostic, preventive and curative strategies, remains as the second leading cause of death from an infectious agent worldwide, after the human immunodeficiency virus (HIV).[2] In 1993, the World Health Organization recognized the lethal impact of this disease and declared it a "Global Emergency".[3]

Multidrug Resistant Tuberculosis (MDR-TB) has emerged as a significant global health concern.[4,5] There are alarming reports of increasing drug resistance from various part of globe which potentially threaten to disrupt the gains achieved in tuberculosis (TB) control over the last decade.[6] The prevalence of MDR-TB mirrors the functional state and efficacy of tuberculosis control programs and realistic attitude of the community towards implementation of such programs in the country.[7]

Drug resistance is a threat to TB control programs worldwide. Patients infected with multiple-drug resistant strains are less likely to become cured [8], particularly if they are infected by HIV or suffer from another immune disease. The treatment is much more toxic and much more expensive (about 700 times) than the one of patients with sensitive organisms.[9]

Based on the results of Gujarat, Maharashtra and Andhra Pradesh DRS Survey, Estimated proportion of MDR-TB is 2.1% (1.5% - 2.7%) in New TB cases and 15% (13%-17%) in previously treated cases. As compared to global rates, the proportions of MDR-TB are lesser in India.[2]

It is crucially important to recognize the individual and collective factors responsible for the heterogeneous global distribution of drug resistance, and to identify those populations at highest risk, in order to be able to develop the most appropriate case finding strategies.

Therefore we planned this study to analyze the various socio demographic correlates influencing development of drug resistance among MDR-TB patients attending PMDT site at Department of Respiratory Medicine, JLN Medical College & Associated Group of Hospitals Ajmer, Rajasthan, from 1st January 2012 to 31st December 2012.

Objectives

1. To assess socio economic distribution of MDR cases reported at hospital
2. To find out various socio demographic correlates of MDR cases reported at hospital.

Material and Methods

Study Design: It was a hospital based observational study. Informed consent of the patient was taken for the study. Approval from institutional ethical committee was obtained for the thesis.

Study Duration: This study was carried out from 1st January 2012 to 31st December 2012 at PMDT site at Department of Respiratory Medicine, JLN Medical College and Associated Group of Hospitals, Ajmer, Rajasthan.

Study Population: All diagnosed cases of Multidrug Resistant Pulmonary Tuberculosis patients reporting to PMDT site at the Department of Respiratory Medicine, JLN Medical College, Ajmer were form the study population.

Inclusion criteria:

The patients with documented evidence of sputum for Mycobacterial Culture & Sensitivity from an Intermediate Reference Laboratories were included in the study population. Following methods were used for Mycobacterial Culture & Sensitivity-

- Conventional solid egg-based Lowenstein-Jensen (LJ) media
- Molecular Line Probe Assay

In Ajmer, at State Tuberculosis Training and Demonstration Centre Mycobacterial Culture and Drug sensitivity is done using Molecular Line Probe Assay. The negative samples from MDR suspect patients on LPA were subjected to culture on conventional solid egg-based Lowenstein-

Jensen (LJ) media and DST was performed for streptomycin (S), isoniazid (H), rifampicin (R), ethambutol (E) and pyrazinamide (Z).

Exclusion criteria:

- Those patients who did not give detailed history or documents were excluded from study group.
- Severely ill patients who are unable to understand the questionnaires.
- The patients that are registered from other PMDT site and reporting at PMDT site at the Department of Respiratory Medicine, JLN Medical College, Ajmer due to treatment related issue were also excluded from the study so that the results are not biased.

Data collection: All information to accomplish objectives was collected by personal interview of each of the study subjects for about 30 to 45 minutes at PMDT site using pre-designed and pre-tested Proforma. A detailed personal history of Occupation, Educational and Socioeconomic status, addiction habit and religion was also assessed.

Statistical Analysis:

Data thus collected was entered into Microsoft excel 2010 worksheet in the form of master chart. Then data were tabulated and analysed as per the aims and objectives with help of appropriate statistical software (Primer statistical software version 6). Microsoft Word and Excel have been used to generate graphs, tables etc.To find out significance of difference in proportions in various groups Chi square test was applied.

Results

There was a peak of admission of the patients in July month (n=60, 20.83%) however there was no association observed between development of MDR tuberculosis and month of admission at PMDT Site. (table 1)

About 2/3rd of the patients were admitted during summer season but there is no correlation found between seasonal variation in admission of the patients and development of MDR TB.(table 2)=

Most of the patients (95.48%) belong to three districts namely Ajmer, Nagour and Bhilwara. The Ajmer district comprises highest number of patients (n=119, 41.31%) However there was no association observed between development of MDR tuberculosis and geographical distribution of the patients. (table 3)

MDR TB can affect all the age groups. In the study population, 214 (74.30%) patients were in the reproductive and economically productive age group of 16-45 years. The overall male female ratio was 4.43: 1 and mean age was about 38 years.(table 4)

Majority of cases were males (n=235, 81.59%). There was significant association observed between MDR TB and male patients. (P value <0.001) (table 5)

Most of the patients 266 (92.36%) were married. The married females were 46 (17.29%) and among them 8 (17.39%) females were lactating mother. In our study population, there was no pregnant female nor in postpartum period. In the married patients, 9 and 30 patients were widow and widower respectively. There were 10 male and 3 female married patients living separated from their spouses respectively.(table 6)

One hundred and sixty patients (55.55%) had history of addiction and it was observed significant association of MDR TB with addiction habit. (P value < 0.001)

One hundred and six (36.80%) patients were tobacco smokers mostly in the form of Bidi followed by cigarette smoking while thirty seven (12.84%) patients were tobacco chewers (in the form of Jarda and Gutkha) There were 59 (20.48%) patients gave history of alcoholism.

Out of 106 smokers, history of multiple addictions of alcohol and opium was also found in 43 and 2 patients respectively. There was no intravenous drug abuser in our study population. Addiction to alcohol seems to have a negative impact on treatment outcome for tuberculosis. However the

difference was not statistically significant. (P value > 0.05) (table 7)

Most of the patients were farmers (23.95%) followed by manual laborers (17.70%) and those working in stone factory (9.37%). Nineteen patients (6.59%) were driver, nine (3.12%) were professional and four (1.38%) patients were deep well driller. All married women were house wife (15.97%) and 14 (4.86%) patients were student in this study. So there was diverse occupational background of these patients.(table 8)

In our study, majority of patients (n=140, 48.61%) belonged to the lower middle economic class of Agarwal's Classification and 66 (22.91%) patients belonged to the Poor economic class. Therefore these patients (n=206, 71.52%) of poor economic class (per capita income <3000) were significantly associated with development of MDR TB in our study. (P value <0.0001 considered extremely significant, Chi-square test)

One hundred and sixty eight (58.33%) patients were illiterate. The illiteracy was found to be significantly associated with development of MDR TB in our study. (P value <0.0001 considered extremely significant, Chi-square test) 32.98% patients were educated up to primary level followed by secondary (5.20%), followed by graduate (2.08%) followed by post graduate (1.38%).(table 9)

TABLE NO. 1. MONTH WISE ADMISSION OF PATIENTS AT PMDT SITE IN THE YEAR 2012

Sr. No.	Months	No. of Patients	Percentage
1.	January	6	2.08%
2.	February	25	8.68%
3.	March	22	7.63%
4.	April	11	3.81%
5.	May	39	13.54%
6.	June	28	9.72%
7.	July	60	20.83%
8.	August	33	11.45%
9.	September	19	6.59%
10.	October	21	7.29%
11.	November	13	4.51%
12.	December	11	3.81%
	Total	288	100%

TABLE: 2 GEOGRAPHICAL DISTRIBUTION OF THE PATIENTS

Sr. No.	Districts	No. of Patients	Percentage
1.	Ajmer	119	41.31%
2.	Nagoure	89	30.90%
3.	Bhilwara	67	23.26%
4.	Jalore*	4	1.38%
5.	Sirohi*	4	1.38%

6.	Jodhpur*	3	1.04%
7.	Jaisalmer*	1	0.34%
8.	Pali*	1	0.34%
	Total	288	100%

TABLE NO. 3 AGE & SEX WISE DISTRIBUTION OF MDR TB CASES

Sr. No.	Age Band (Years)	No. of Patients			Percentage
		Male	Female	Total	
1.	<15	1	2	3	1.04%
2.	16-25	43	9	52	18.04%
3.	26-35	62	21	83	28.81%
4.	36-45	68	11	79	27.43%
5.	46-55	36	7	43	14.93%
6.	56-65	21	3	24	8.33%
7.	>65	4	0	4	1.38%
	Total	235	53	288	100%

TABLE NO. 4: MARITAL STATUS OF THE PATIENTS

Sr. No.	Marital Status	No. of Patients			Percentage
		Male	Female	Total	
1.	Married	220	46	266	92.36%
2.	Unmarried	15	7	22	7.63%
	Total	235	53	288	100%

TABLE NO. 5: DISTRIBUTION OF PATIENTS ACCORDING TO PLACE OF RESIDENCE

Sr. No.	Demographic variables	No. of Patients	Percentage
1	Rural	235	81.59%
2	Urban	53	18.40%
	Total	288	100%

Most of the patients (82%) were from rural set up in our study.

TABLE NO. 6: ADDICTION HABIT

Sr. No.	Addiction	No. of Patients	Percentage
1.	No addiction	128	44.44%
2.	Smoking tobacco	106	36.80%
3.	Alcoholism	59	20.48%
4.	Tobacco chewing	37	12.84%

5.	Opium	3	1.04%
6.	Intravenous drug abusers	0	0%

TABLE NO. 7: OCCUPATIONAL STATUS/ WORKING STATUS

Sr. No.	Occupational Status	No. of Patients	Percentage
1.	Farmer	69	23.95%
2.	Manual labour	51	17.70%
3	House wife	46	15.97%
4	Others	44	15.27%
5.	Worker in stone factory	27	9.37%
6	Driver	19	6.59%
7	Student	14	4.86%
8	Professional	9	3.12%
9	Deep well driller	4	1.38%
10.	Worker in Cotton factory	2	0.69%
11.	Worker in Iron factory	2	0.69%
12.	Welding worker	1	0.34%
	Total	288	100%

TABLE NO. 8: PER CAPITA INCOME (RS. /MONTH)

Sr. No.	Per Capita Income (Rs./Month)	No. of Patients	Percentage
1.	<500	61	21.18%
2.	500-1499	4	1.38%
3.	1500-2999	140	48.61%
4.	3000-4999	66	22.91%
5.	5000-9999	12	4.16%
6.	>10000	5	1.73%
	Total	288	100%

TABLE NO. 9: EDUCATIONAL STATUS OF THE PATIENTS

Sr. No.	Educational Status	No. of Patients	Percentage
1	Illiterate	168	58.33%
2	Primary	95	32.98%
3	Secondary	15	5.20%
4	Graduate	6	2.08%
5	Post-Graduate	4	1.38%
	Total	288	100%

Discussion

We have undertaken an observational study to assess the various socio demographic factors influencing development of drug resistance among 288 MDR TB patients in a tertiary care center in India, the first study to do so to date.

In our study, the Ajmer district comprises highest number of patients (n=119, 41.31%) because the Ajmer is the central part of this DOTS-Plus covering area and the culture and drug sensitivity testing facility is available at STDC (IRL) for diagnosis of MDR TB. It is also the first among these districts where RNTCP was started. Here DOTS programme began from 2nd October 1999. Since then, by corridor expansion strategy its coverage has increased from 73% to 81% in December 2003 and approximately 100% in December 2004.

In the study subject, most of cases were males (n=235, 81.59%) and male sex co-relates well with MDR-TB in our study. This may be due to an increased awareness of health and increased care seeking tendency of males. It was sensed that women were more compliant with treatment and therefore less likely to receive inadequate treatment. The case-series study[10]by Pant et al in Nepal also observed that 70% (22 out of 31) of the patients were male and male sex significantly co-relates with MDR TB.

Most of the patients (n=214, 74.30%) were in the reproductive and economically productive age groups and mean age was about 38 years. In epidemiological study [11] at Ahmadabad, 83.7% (n=77) of the patients were in the reproductive age group of 16-45 years with mean age of about 34 years and these data were almost similar to our study.

Most of the patients (n=266, 92.36%) were married. There were 30 (10.41%) male and 9 (3.12%) female were widower and widow respectively. In epidemiological study [11] at Ahmadabad, 55 (67.9%) patients were married with 4.9% were widow/er. The married patients have benefit of gaining emotional support from their spouses and it might help in treatment completion and strong confidence of early recovery from the disease.

Around 57% (n=165) of patients were addicted to tobacco and/or alcohol any time during their disease state. An epidemiological study in Ahmedabad also showed that around 57% of MDR TB patients were addicted to tobacco and/or alcohol.[132] Studies in Russia showed alcohol abuse/dependence[12] and smoking[13]were associated with drug resistance.

Dual addiction with alcohol and smoking was observed in 43 (15%) patients in our study. A case-control study[14] by Barroso et al suggested that 39% (52 patients out of 134) of the patients with dual addiction of smoking and alcohol were associated with development of MDR TB.

About 20% (n=59) patients were alcoholic in our study. Alcoholism may contribute in the default behavior and negligence towards anti-tuberculosis medication of patients and therefore have a negative impact on treatment outcome for tuberculosis. However the association of alcoholism with MDR TB was not statistically significant in our study. (P value > 0.05) A pilot study[15]by Marahatta et al in Central Nepal observed that about 52% (29 out of 55) of the patients were alcoholic and were of the same opinion that alcoholism was not associated with development of MDR TB.

Tuberculosis affects all groups of people, especially the poor, probably because of poor overall hygiene, poor living conditions, poor nutrition and immune status. Illiteracy affects patient's knowledge about tuberculosis and its treatment. These patients may be unaware of fatality of disease and consequence of interruption or default with anti-tuberculosis medication. Hence it indirectly contributes to development of MDR TB.

Conclusion:

MDR is strongly affecting all the strategies implied by the government for the prevention and control of tuberculosis. Effective development of data pool for MDR cases is the urgent necessity to

combat this creeping malady effectively. This study was an attempt to conform the before mentioned approach and it also warrants and instigates other researcher to do some qualitative research to find out other factors associated with MDR cases more candidly with exorbitant external validity.

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Conflict of interest: None

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