

A Study of Proportion of Comorbidities in Multidrug Resistant Tuberculosis Patients in a Tertiary Care Centre of Western Rajasthan

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Abstract

Background

National drug resistance survey suggest that magnitude of DR-TB is 2.84% in New patients and 11.62% in previously treated patients.Comorbid conditions have impact as risk factor for development of DR TB as well as driver of unsuccessful outcome.Association of comorbidities in DR TB patients at time of treatment initiation is of significant importance.

Objective

To assess proportion of various comorbidities in DR TB at time of treatment initiation and their associated socio- demographic characteristics.

Materials & Methods

It is observational cross sectional study conducted with sample size of 400 DR TB patients Inclusion criteria 1) Both Gender & any age Exclusion criteria 1) XDR TB patients 2) transferred out patients.

Results

Among 400 DR TB patients, comorbid conditions found in 343(85.75%) study patients. Most common comorbidity seen is Anaemia f/ b Occupational lung disease f/ b Diabetes mellitus f/ b COPD f/ b Depression f/ b HIV. Comorbidities are more common in Productive age group(21-50 years),Rural,Hindu,Married population.

Conclusion

Chief comorbidities seen in DR TB patients are Anaemia f/ b Occupational lung disease f/ b Diabetes mellitus f/ b COPD f/ b Depression f/ b HIV.

Date of Submission: 20-03-2021

Date of Acceptance: 04-04-2021

I. Introduction

A MDR-TB patient is defined as whose sputum is culture positive for Mycobacterium tuberculosis and is resistant in-vitro to isoniazid and rifampicin with or without resistance to other anti-tubercular drugs based on DST results from a RNTCP-certified Culture & DST Laboratory.

As per Global TB Report 2020, there are 465000 estimated New cases of MDR-TB/RR-TB globally¹. MDR-TB was found in approximately 3.3% of New cases and approximately 18% of retreated cases more than half MDR-TB burden lies in India,China and Russian Federation. In India,estimated percentage of new and retreatment cases with MDR/RR-TB was 2.2% and 18% respectively¹.it has been estimated that in 2020 there were estimated 124000 incident MDR/RR-TB cases in India¹.

The effect of associated comorbid conditions on treatment of drug sensitive TB especially HIV,Diabetes Mellitus (DM) has been well known.The associated comorbidities may be one of factors for poor response to MDR TB treatment.

The comorbid conditions may have both impact as risk factor for developing MDR TB and they may influence the treatment outcomes as well. Therefore their association is of significantly important.

II. Aims & Objectives

- 1) To find out overall proportion of any comorbidity in MDR TB patients.
- 2) To find out proportion of different individual comorbidities in MDR TB patients.

3) To determine any association of these comorbidities with socio- demographic characteristics.
MATERIAL & METHODS:- a cross sectional observational study conducted in Kamla Nehru Chest Hospital Jodhpur,Rajasthan(DR TB Centre) after approval from institutional ethical committee. All confirmed 400 multidrug resistant pulmonary tuberculosis patients as per RNTCP criteria admitted for pre-treatment evaluation & for checking Comorbidities in them².

The pre-treatment evaluation² consist of detailed clinical evaluation,History & Physical examination,Height & Weight,Sputum smear for Acid Fast Bacilli, CBNAAT/LPA report, complete blood counts(Hb,TLC,DLC,Platelet count), Random blood sugar,Blood Urea & serum Creatinine,liver function tests, TSH levels,serum Electrolytes(Na⁺,K⁺,Ca⁺⁺,Mg⁺⁺), serumProtein (Albumin, Globulin & Total Protien), ECG(if pt on Mfx,Bdq,Cfz or Dlm), Urine examination-Routine & Microscopic,Urine Pregnancy Test,HIV counselling & Testing, chest X-ray, Ophthalmologist opinion, Audiogram, Cardiologist opinion, Psychiatric opinion & Surgical evaluation.

SOURCE OF DATA

All MDR TB patients of either gender who are admitted or attending the OPD of Kamla Nehru Chest Hospital,Jodhpur.

CRITERIA OF INCLUSION IN STUDY

1. All MDR TB patients of either Gender and any age group.
2. MDR patients whose complete clinical details and investigations are available.

CRITERIA OF EXCLUSION IN STUDY

1. XDR TB patients.
2. Transferred out patients from our DR-TB unit.
3. Patients refused to give consent for active participation in study.

STATISTICAL ANALYSIS

Proportion of various comorbidities in MDR-TB patients were assessed and their association with sociodemographic characteristics were found.The results were considered statistically significant if p value was <0.05.

III. Results & Observations

Most of patients were Rural background 339(84.75%), Married 351(87.75%), Hindu 363(90.75%).

Around 72.25%(289/400) belongs to Productive age group(21-50 years). Males were most common290(72.5%) while females were 110(27.5%). Mean age was Higher for Males (39.16) than Females(32.56) years. This age-gender wise distribution of study patients found statistically significant (P value<0.0001)

Majority of patients have total duration of illness 6-24 months(49.50%) followed by >24 months(31.50%) Mean of Duration of illness with Multidrug Resistant Tuberculosis patients was 13.12 months(1.09 years).Most common resistance pattern was Rifampicin resistance.

Table 1: Sociodemographic variables of study population

Sociodemographic variable		Number of patients	Percentage
Age	<21 years	41	10.25%
	21-50 years	289	72.25%
	>51 years	70	17.5%
Sex	Male	290	72.5%
	Female	110	27.5%
Religion	Hindu	363	90.75%
	Muslim	37	9.25%
Marrietal status	Married	351	87.75%
	Unmarried	49	12.25%
Population	Rural	339	84.75%
	Urban	61	15.25%

Table 2 : Age & Gender Distribution among study patients

Age (yrs)	Male		Female		Total	
	N	%	N	%	N	%
12-20	21	7.24	20	18.18	41	10.25
21-30	68	23.45	37	33.64	105	26.25
31-40	74	25.52	30	27.27	104	26.00
41-50	68	23.45	12	10.91	80	20.00
51-60	34	11.72	3	2.73	37	9.25
≥61	25	8.62	8	7.27	33	8.25
Total	290	100.00	110	100.00	400	100.00

Table 3: Proportion of different Comorbidities among study patients

Co-morbidities	No. of patients	Percentage
Occupational lung disease	188	47.00
Anemia	196	49.00
Diabetes	153	38.25
COPD	55	13.75
HIV	15	3.75
Neurological disease	4	1.00
Depression	36	9.00
Kidney disease	3	0.75
Liver disease	9	2.25
Hypertension	2	0.50

Table 4 : Occupation wise distribution of various comorbidities

Co-morbidities	Manual labourer	Stone cutter	Farmer	Others	p value
Occupational lung disease	36	152	0	0	<0.0001
Anemia	26	72	25	73	0.168
Diabetes	19	75	20	39	<0.0001
COPD	3	32	18	2	<0.0001
HIV	1	7	1	6	0.851
Neurological disease	1	1	0	2	0.676
Depression	5	17	5	9	0.265
Kidney disease	3	1	1	1	0.012
Liver disease	1	8	0	0	0.011
Hypertension	1	1	0	2	0.676
P value	0.080	<0.0001	<0.0001	<0.0001	-

TABLE 5: Addiction wise distribution of various comorbidities

Comorbidities	Addiction			
	Smoking	Alcoholism	Tobacco	Opium
Occupational lung disease	88	81	40	9
Diabetes	62	53	27	6
Anemia	63	44	41	5
COPD	55	9	2	4
HIV	4	6	0	0
Depression	12	11	10	1
Kidney disease	1	0	0	0
Liver disease	7	5	0	0
Hypertension	1	1	0	0
Neurologic disease	1	2	1	0

TABLE 6 : Distribution of patients according to type of lesion on baseline chest Radiograph

Chest x-ray lesions	No. of patients (n=400)	Percentage
Bilateral	203	50.75
Unilateral	184	46.00
Cavitation	126	31.50
Nodularity	179	44.75
Other	91	22.75

IV. Discussion

in present study among 400 MDR patients there are 290 (72.50%) Males and 110(27.50%) Females with mean age of study group was 37.35 years(with C.I. 95% of mean +13.92) suggestive of Male predominant study and statistically significant (p-value<0.0001) other study done by Dr Kamendra singh pawar etal³ in which among total 127 patients, 101(79.5%) Males and 26(20.4%) Females with mean age of study group was 38.6 years. Similar results seen with study by Swapnil Jain etal⁴ total 474 patients, 347(73.2%) Males and 127(26.8%) Females with mean age of study group 38 years. Similar results also seen in study by Dholkia and Shah et al⁵, majority of cases were in age group15-35 years with mean age 31 years.

In present study, Majority of study patients 72.25%(289/400) are from productive age group (21-50 years) which is statistically significant P value<0.0001.Present study is concordant with study by Swapnil Jain et al⁴, where more than 51% study patients were in productive age group(20-49 years).Similar results also reported with study by Dholkia and Shah et al⁵, in which 67.6% cases were in productive age group 15-35 years.

In Present study, maximum study patients 339(84.75%) patients belong to Rural area. Most of study patients were from lower socioeconomic background with low education level and were nutritionally challenged. Similar rural predominance was also seen in other studies like study by Swapnil Jain et al⁴ in which 61% of total study patients are from rural area and study by Ibrahim et al⁶, in which 81.5% study patients live in rural area . study by K. Aid et al⁷, in which most of study patients are from rural area.

In present study, Males had Higher Mean age(39.16years) as compared to Females (32.56 years).This distribution of study patients found statistically significant(P value <0.0001).

Most of patients were Rural background & poor socioeconomic status. The most common affected occupation was Stone cutter(38%) f/b housewives(16.75%) f/b Farmer(11%) f/b Manual Labourer(10.5%) in present study. Study by Swapnil Jain et al⁴ labourer(36.3%) f/ b farmer(31.2%) f/ b housewife(15.2%). Study by Mukharjee et al⁸ reported most commonly affected occupation as household worker. Study done by Wei-bin et al⁹ suggested unskilled worker was most commonly affected occupation followed by farmer.

In present study, most of the study patients were nil addiction 142(35.50%). Among Addiction habit, most common addiction was Smoking 129(32.25%) f/ b Alcoholism 104(26%) f/b Tobacco chewing 73(18.25%).Similar results seen with study with Swapnil jain et al⁴ smoking (35.4%) , Study by Khurram et al⁹ smoking(60%), study by K. Aid et al smoking (74%) patients, Study by Ibrahim et al commonest habit was tobacco smoking.

In present study, out of total 400 Multi drug resistant tuberculosis patients, Co-morbid conditions were present in 343 (85.75%) patients but 57 patients had No Comorbidities. Most common comorbidities seen in study patients is Anemia 196(49%) followed by Occupational lung disease 188 (47%) followed by Diabetes mellitus 153(38.25%) followed by COPD 55(13.75%) f/b Depression 36(9%) f/b HIV 15(3.75%) f/b liver diseases 9(2.25%) f/b Neurological diseases 4(1%), Kidney disease 3(0.75%) and Hypertension 2(0.50%).This is found Statistically significant(p value<0.0001). Similar results also reported by another study done by Swapnil jain et al⁴ chief comorbidity was Anemia 176(37.1%) f/b COPD 123(25.9%) f/ b Bronchiectasis 78(16.5%) f/b Heart diseases 50(10.5%) f/b Diabetes mellitus 39(8.2%).

Since, present study region is high bulk of stone cutting mines(Jodhpur) of Western Rajasthan and major occupation among rural population is stone cutting, thus occupational lung disease was second chief comorbidity.

Another study by Kamendra singh Pawar et al³ shows ,Comorbidities were present in 51 (40.1%) study patients.chief comorbidities were COPD 16(12.5%) f/ b Occupational lung disease 14(11%) f/b Hepatic disease 3(2.3%) f/b Neurological Disease 3(2.3%) f/b Diabetes mellitus 2 (1.5%).

Another studies by Dhingra et al¹⁰ shows 10(37.0%) patient had Comorbidities, chief Comorbidity was Diabetes Mellitus.study by Ibrahim I. Elmahallawy et al¹¹ shows chief comorbidities was diabetes mellitus(15%)f/b liver disease(4%). A study by Mohammed et al¹² shows that chief comorbidity was Diabetes mellitus (15%). study by Kamal et al¹³ shows diabetes mellitus(26.9%)was chief comorbidity.study by Fawzy et al¹⁴ shows Diabetes Mellitus (80.7%) was chief comorbidity.study by Joseph et al, chief comorbidity was Diabetes Mellitus was 12 patients(31.5%).

In present study, out of total 400 Multidrug Resistant Tuberculosis study patients, 363(90.75%) are Hindu f/b 37(9.25%) Muslim patients. 351(87.75%) patients were married population.

The Mean duration of illness with multidrug resistant tuberculosis patients in present study is 13.12 months. Majority of patients in our study have total duration of illness 6-24 months(49.50%) followed by >24 months(31.50%).

Radiologically Bilateral lung involvement was seen in 50.75% patients of present study while Unilateral lung lesion seen in 46% of study patients.

Nodularity seen throughout lung fields in chest x-ray of 44.75% study patients, while cavitation is seen in 31.50% study patients.While 91(22.75%) study patients have other lesions (Bronchiectasis, hyperinflation, progressive massive fibrosis, Lymphadenopathy, pleural involvement and consolidation) in their chest x-ray.

Overall comorbid conditions are predominant in Male study Patients.This is found Statistically significant(p-value <0.0001) specially for Occupational lung disease, Diabetes Mellitus and COPD.

Overall comorbid conditions are more common in Rural population.

Overall comorbidities are more common in Married population which was found to be statistically significant (p value <0.0001).

Overall comorbidities are more common in lower BMI group(<18.5) of study patients.

Occupation wise distribution of comorbidities found statistically significant for Occupational lung Disease, Diabetes Mellitus, COPD, Kidney disease and Liver disease comorbid conditions(P value <0.0001).

Most of the comorbid conditions i.e. Anemia, Occupational lung disease, Diabetes mellitus, COPD, depression, liver diseases are more common in Smokers but HIV is more common in Alcoholics, P value <0.0001(statistically significant)

Most common resistant pattern seen in present study patients with comorbidities is RR pattern.

Overall comorbidities are more common in below 50 years age group. This age wise distribution of comorbid conditions is statistically significant for Occupational lung disease, Diabetes, COPD and HIV , P value< 0.005(Statistically significant).

V. Conclusion

MDR-TB is an important public health problem in India. The epidemiological picture of TB showed that males were predominant in our study however female were more affected in younger age group compared to male. More than 72.25% of the cases were in productive age group which affects the socioeconomic condition of family and society. More than 2/3 of patients were from lower socioeconomic group with low BMI. Therefore improving nutrition and immunity can play an important role. Majority of our patients were from rural area i.e. 84.75%. 26% cases were addicted to alcohol and 32.25% cases were addicted to smoking. Comorbidities like COPD and Diabetes were seen in our study which were statistically significant. all the contacts must be screened up.

Recommendations of Present study

Maximum number of study patients had anemia and lower BMI so nutritional support may be added as integral part of the NTEP programme

(a) Since occupational lung disease is second chief comorbid condition in study patients so periodic screening of those working as stone cutters should be done regularly and frequently.(periodic evaluation of respiratory symptoms, spirometric abnormalities, radiographic changes & sputum smear microscopy)

(b) Preventive Measures:- conduct air monitoring to measure worker's exposure to crystalline silica.

Minimize exposures by controlling the creation of airborne particles eg:- use Wet drilling of stone, use local exhaust ventilation.

personal protective equipments for workers i.e. Protective clothes(Tyvek suit, Gloves, Goggles, Boots), Respirators for airways protection, facilities for shower after work and changing clothes.

Environmental monitoring of silica dust must be done.

(c) Occupational lung disease study patient once diagnosed as multi drug resistant tuberculosis than whole family members and contacts of this drug resistant tuberculosis patient should be thoroughly screen for tuberculosis and once contact also diagnosed as multi drug resistant tuberculosis then he/she should be treated completely.

Maximum cases of MDR-TB were in productive age group and the disease affects the low socio-economic status of family, so financial support can play an important support in the management of these cases i.e. some provision for providing them house hold jobs, providing good nutrition etc.

All close contacts of study patient should be screen for Tuberculosis

De-addiction programme should be introduced in national programme as large no. of study patients were addicted to smoking and alcoholism.

Good counselling is an important prognostic factor in improvement of mental health in disorders like depression and psychosis.

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