

**A study of proportion of comorbidities among patients having multidrug resistant tuberculosis**

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**Abstract**

**Background:** Present study is designed to study proportion of Comorbidities in Multidrug Resistant Tuberculosis patients at Hospital for Respiratory diseases, SPMC & PBM AGH, Bikaner.

**Methods:** A cross sectional observational study conducted in The Hospital for Respiratory Diseases, S. P. Medical College, Bikaner, a tertiary care center for respiratory diseases in Rajasthan.

All confirmed Pulmonary MDR TB patients of both sex admitted for pre-treatment evaluation to our DR-TB centre will included in study to see prevalence of Comorbidities in Multi Drug Resistant Tuberculosis patients. Pre-treatment evaluation consists of detailed clinical evaluation, complete blood counts, Blood sugar, Renal function tests, Liver function tests, TSH levels, Urine examination, Chest X-ray, Height and Weight measurements and Pregnancy test (for women of Childbearing age group) with voluntary HIV testing.

**Results:** Most common comorbid condition seen in study patients is Anemia (36%) followed by Diabetes (12%) &

COPD (11%), followed by HIV (4%) followed by Hypothyroidism (3%), Hypertension (3%) followed by Psychiatric illness (2%), kidney disease (2%) & liver diseases (2%) followed by COVID (1%) & Pregnancy (1%). By looking at Gender distribution, Male preponderance is seen among overall comorbidities except Anemia, COVID & Pregnancy.

**Conclusion:** Great proportion of study subjects with MDR TB were found to have comorbid conditions. Proper identification and Management of such concurrent medical conditions is vital as these comorbidities may affect the outcome of treatment which itself is challenging. Maximum number of study patients had Anemia and Low BMI, so Nutritional support may be added as integral part of the NTEP programme.

**Keywords:** COVID, MDR TB, Low BMI.

**Introduction**

Tuberculosis (TB) is a communicable disease that is a major cause of ill health and one of the leading causes of death worldwide. Until the coronavirus (COVID-19)

pandemic, TB was the leading cause of death from a single infectious agent, ranking above HIV/AIDS<sup>1</sup>.

MDR-TB is a great challenge to clinicians for both diagnosis and management due to various reasons namely lengthy and complex treatment, less effective than first lines drugs, more side effects and longer duration, only 50 % of patients of MDR-TB were successfully treated, largely as a result of high mortality and lost to follow up.

The Comorbid conditions may have both impact as risk factor for developing MDR TB and may influence the treatment outcome of the disease. Comorbidities like malnutrition, diabetes, HIV, usage of tobacco-smoking and alcohol cause weakening of the immune system and increase the chances of an individual to progress from TB infection to TB disease within a shorter time and can also lead to an increase in severity of TB illness. These conditions are risk factors and important contributors to the TB burden and poor TB treatment outcomes. Therefore, it is essential to identify these comorbidities in people diagnosed with TB to improve ecomanagement because TB and its treatment can complicate the management of some of these conditions and vice versa<sup>3</sup>. According to Global TB Report, In 2020 out of 10 million TB cases 1.9 million were undernourished, 0.74 million had HIV Infection, 0.74 million were alcoholics, 0.73 million were smokers and 0.37 million diabetics among them<sup>4</sup>.

Present study is designed to study proportion of Comorbidities in Multidrug Resistant Tuberculosis patients at Hospital for Respiratory diseases, SPMC & PBM AGH, Bikaner.

### Material and method

- Study design: Hospital based cross-sectional observational study.

- Duration of Sample collection: From the approval of plan till 31<sup>st</sup> December 2022.

- Study place: Department of Respiratory medicine, S.P. Medical College and P.B.M Hospital, Bikaner

- Sample size:

Sample size was calculated at 95% confidence interval to verify an expected 25% proportion of Comorbidities in MDR TB (based on study conducted by Marina kikvidze et al) at 10% precision / absolute allowable error. Sample size was calculated using the formula for sample size for estimation of proportion –

$$N = \frac{Z_{1-\alpha/2}^2 P (1 - P)}{E^2}$$

Sample size was calculated to be to be minimum 75 subjects which was enhanced and rounded off to 100 subjects.

### Methodology

A cross sectional observational study conducted in The Hospital for Respiratory Diseases, S. P. Medical College, Bikaner, a tertiary care center for respiratory diseases in Rajasthan. All confirmed Pulmonary MDR TB patients of both sex admitted for pre-treatment evaluation to our DR-TB centre will included in study to see prevalence of Comorbidities in Multi Drug Resistant Tuberculosis patients. Pre-treatment evaluation consists of detailed clinical evaluation, complete blood counts, Blood sugar, Renal function tests, Liver function tests, TSH levels, Urine examination, Chest X-ray, Height and Weight measurements and Pregnancy test (for women of Childbearing age group) with voluntary HIV testing. Baseline information, Baseline Haematological, Biochemical investigations, Socio demographic profile, Previous TB treatment, Drug resistance pattern obtained. Detailed clinical evaluation with great emphasis on previous and current medical comorbid conditions during

pre-treatment evaluation obtained. Patient encouraged for self-reporting of any concurrent medical illness. Once patient give any history regarding comorbid medical conditions, relevant documents and investigations reviewed thoroughly. Medical comorbid conditions diagnosed during detailed pre-treatment clinical evaluation and investigations included in study.

**Inclusion criteria**

1. All Pulmonary MDR TB patients of both Gender and any age, admitted for Pre Treatment Evaluation to DR-TB Center and attending Outdoor in follow-up.
2. MDR patients whose complete clinical details and investigations are available.

**Exclusion criteria**

1. XDR TB patients.
2. Drug Sensitive TB patients.
3. Extra Pulmonary MDR TB patients.
4. Patients refused to give consent for active participation in study

**Ethical considerations**

Informed consent was obtained from all the participants. Ethical approval for the study was obtained from the Institutional Ethical Committee. Study population was selected after applying inclusion and exclusion criteria.

**Methodology**

We took demographic features and baseline patient characteristics like previous history of ATT, occupations, habits of addiction, co-morbid conditions and resistance pattern.

This was a cross-sectional observational study of MDR-TB patients who were admitted in drug resistant tuberculosis center (DR-TB center) for initiation of PMDT.

The research proposal was submitted to the Ethical Committee of S.P. Medical College, Bikaner for approval and the study was started after getting permission from the concerned authority.

**Statistical analysis**

Data was arranged in Microsoft excel sheet and statistical analysis performed by using student's "t" test and Chi square test to find out the significance of difference between two variables.

**Results**

Table 1: General characteristics

Mean age	41.2 ±9.28 Yrs
Male: Female	63:37

Table 2: Proportion of Comorbidities among study patients

Co-morbidities	No. of patients	Percentage
Anemia	36	36
Diabetes	12	12
COPD	11	11
HIV	4	4
Psychiatric illness	2	2
Hypothyroidism	3	3
Kidney disease	2	2
Liver disease	2	2
Hypertension	3	3
COVID	1	1
Pregnancy	1	1
Occupational lung disease	Nil	0

By observing this table, Most common Comorbid condition among our study patients was Anemia (36%) followed by Diabetes (12%) followed by COPD (11%).

Table 3: Addiction wise distribution of various comorbidities

Co-morbidities	Addiction				P Value
	Smoker	Alcoholic	Tobacco	Opium	
Anemia	10	02	04	03	0.000

Diabetes	04	01	03	00	0.00 0
COPD	11	02	00	01	0.00 2
HIV	03	04	00	00	0.00 0
Psychiatric illness	01	00	00	00	--
Hypothyroidism	00	00	01	00	--
Kidney disease	00	00	00	00	--
Liver disease	01	02	00	00	0.76 3
Hypertension	02	01	01	00	0.00 0
COVID	00	00	01	00	--
Pregnancy	00	00	00	00	--

• As seen in above table, Most of the comorbid conditions i.e. Anemia, Diabetes mellitus, COPD, Psychiatric illness, Hypertension were more common in Smokers but HIV and Liver disease were more common in Alcoholics.

• The Addiction wise distribution of various comorbidities were found statistically significant for Anemia, Diabetes, HIV, Hypertension & COPD.

**Discussion**

As per Global TB report 2021, In 2020 there were approximately 558000 estimated new cases of MDR TB/ Rifampicin resistant TB globally and MDR TB was found in approximately 3.6% of new cases and approximately 17% of retreated cases. In INDIA, the estimated percentage of new and retreatment cases with MDR/RR TB was 2.2% and 18% respectively.

Associated Comorbid conditions in tuberculosis patients are the driver of unsuccessful treatment outcome and also risk factor for developing multidrug resistant tuberculosis.

In present study, out of total 100 Multi drug resistant tuberculosis patients, Co-morbid conditions were found in 77 study patients but 23 study patients had No Comorbidities. Most common Comorbidity seen in study patients was Anemia (36%), followed by Diabetes (12%), COPD (11%), HIV (4%), Hypothyroidism (3%), Hypertension (3%), Psychiatric illness (2%), kidney disease (2%) & liver diseases (2%) followed by COVID (1%) & Pregnancy (1%). This is found Statistically significant (p value<0.0001). Similar results also reported by another study done by Swapnil Jain et al<sup>83</sup>, in which most common comorbidity as Anemia 176 (37.1%) followed by COPD 123 (25.9%) followed by Bronchiectasis is 78 (16.5%) followed by Heart diseases 50 (10.5%) followed by Diabetes mellitus 39 (8.2%).

Since, present study region is having high bulk of Agricultural land and major occupation among rural population is Farming & they use to smoke frequently, thus COPD has been found as one of the chief comorbid conditions in multi drug resistant tuberculosis study patients.

Another study by Dr Kamendra Singh Pawar, Dr Ramakant Dixit<sup>5</sup>, shows among 127 study patients, Comorbidities were present in 51 (40.1%) study patients. COPD 16 (12.5%) patients was most common comorbidity followed by Occupational lung disease 14 (11%) followed by Hepatic disease 3 (2.3%), Neurological Disease 3 (2.3%) followed by Diabetes mellitus 2 (1.5%).

Another study by Dhingra et al<sup>6</sup> have 10 (37.0%) study patients suffered from comorbidities, most common Comorbidity was Diabetes Mellitus.

Another study by Ibrahim I. Elmahallawyet al<sup>7</sup>, says most common comorbidity associated with MDR TB patients was diabetes mellitus (15%). second comorbidity was liver disease (4%). No statistically significant difference could be detected between males and females according to associated comorbidities.

A study by Mohammed et al<sup>8</sup>, concluded that higher frequency of Diabetes mellitus (15%) was associated with MDR TB patients than other comorbidities with no statistically significant difference between males and females in regards to associated comorbidities.

Another study by Kamal et al<sup>9</sup>, found patients with diabetes mellitus constituted 26.9% of studied MDR TB patients. This study concluded that diabetes mellitus as most common associated comorbidity in MDR TB patients.

A study by Fawzyet al<sup>10</sup>, suggests Diabetes was seen in 80.7% of studied MDR TB patients as most common comorbidity associated in MDR TB patients.

A study conducted by Joseph et al<sup>6</sup>, 12 patients (31.5%) had Diabetes Mellitus as comorbidity in Multi drug resistant T.B. patients.

### **Conclusion**

Maximum number of study patients had Anemia and Low BMI, so Nutritional support may be added as integral part of the NTEP programme.

Since COPD is the second chief comorbid condition in our study and most patients were smoker so people should be aware regarding smoking related health hazards and motivated to quit smoking via smoking cessation clinics, using ICE, Pharmacotherapy etc.

All close contacts of tuberculosis patients should be screened for tuberculosis.

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