

## Treatment Outcomes And Resistance Patterns In Patients Of MDR-TB Started On Shorter Oral Bedaquiline Regimen

Dr. Bhavi Shah \*, Dr. Jigna Dave\*\*\*, Dr. Vishal Kansara\*\*

\*Resident Doctor, \*\*Senior Resident, \*\*\*Professor And Head, Department Of Respiratory Medicine, Government Medical College, Bhavnagar, Gujarat. India 364001

**Abstract:** Background: 1.To determine the efficacy of shorter oral BDQ regimen in patients of MDR-TB/RR-TB in terms of treatment outcome. 2. To determine the prevalence of MDR-TB/RR-TB based on age and gender 3. To study the resistance patterns and its association with comorbidities. Material And Methods: This is a retrospective study of 50 patients conducted from August 2021 to December 2022. Patient data sputum AFB and CBNAAT, sputum culture conversion, comorbidities, resistance pattern, age and gender based prevalence and site of infection was collected from District Tuberculosis Centre, Bhavnagar. Result: Total 50 patients of pulmonary tuberculosis were included of which there were 66% males, 34% females with maximum being in age group of 21-40 years. Of total patients included, 58% were cured, 14% lost to follow up, 8% expired and 20 % are on treatment. Results were indicative of 73% cure rate. Of this 4% patients were HIV positive, 12% were diabetic. In terms of resistance, 52% had RIF+ KAT G resistance, 46% had Rif resistance and 2% had Rif + Inh A resistance. Conclusion: Introduction of Shorter oral BDQ regimen has significantly improved compliance as it reduced duration by almost half which ultimately lead to improvement in treatment success rate. [Shah B Natl J Integr Res Med, 2023; 14(4):21-24, Published on Dated: 8/07/2023]

**Key Words:** MDR TB, Resistance Patterns, Shorter Oral BDQ Regimen

**Author for correspondence:** Dr. Bhavi Shah, Resident Doctor, Department Of Respiratory Medicine, Government Medical College, Bhavnagar, Gujarat. E-Mail: incyshah07@gmail.com

**Introduction:** Tuberculosis continues to be a huge peril disease against the human population and according to WHO, tuberculosis is a major killer of the human population after HIV/AIDS. Tuberculosis is highly prevalent among the low socioeconomic section of the population and marginalized sections of the community<sup>1</sup>.

As with other antibiotics, antibiotic resistance is inevitable with anti-TB agents. Drug-resistant TB (DR-TB) is the main challenge of the WHO Global TB Programme due to its high risk of relapse, treatment failure, prolonged transmission of the bacilli, and death<sup>5</sup>.

Multidrug-resistant tuberculosis (MDR-TB) is defined as a disease due to Mycobacterium tuberculosis that is resistant to at least both rifampicin and isoniazid with or without resistance to other anti-tuberculosis (TB) drug.

A total of approximately one hundred and thirty thousand incident multidrug resistant patients with TB emerge annually in India which includes approximately 79,000 patients with MDR-TB among notified pulmonary cases<sup>2</sup>. In WHO 2017 report, 3.5% of new cases and 18% of previously treated cases are estimated to be multidrug-

resistant tuberculosis<sup>3</sup>. Over the past few decades, treatment of multidrug-resistant (MDR)/extensively drug-resistant (XDR) tuberculosis (TB) has been challenging because of its prolonged duration (up to 20–24 months), toxicity, costs and sub-optimal outcomes.

Those with MDR TB can present with cough (lasting longer than two weeks), chest pain, coughing up of blood or sputum (mucus), fatigue or weakness, loss of appetite, Weight loss Chills, Fever, and Night sweats.

In May 2016, the WHO recommended the use of a shorter treatment regimen of 9-12 months for patients with RR-TB or MDR-TB who have not been previously treated with second-line drugs and in whom resistance to fluoroquinolones and second-line injectable agents has been excluded<sup>6</sup>.

**Material & Methods:** This is a retrospective study conducted in Department of Respiratory medicine, Sir T Hospital, Bhavnagar after 54 Patients who fulfilled the criteria according to WHO guidelines of MDR-TB that is “Resistance of Mycobacterium tuberculosis strains to at least isoniazid and rifampicin, the cornerstone medicines for the treatment of TB. Rifampicin-

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resistant disease on its own requires similar clinical management as MDR-TB” Were included in the study. Patients with Fluoroquinolone resistance and second line anti TB drugs resistance who were started on all oral longer regimens were excluded from the study. Patients who were started on shorter oral BDQ containing MDR regimen in the time duration from August

2021 to December 2022 were enrolled after due ethical considerations and permission from ethical committee. Patient data on sputum AFB and CBNAAT, sputum culture conversion, comorbidities, resistance pattern, age and gender based prevalence and site of infection was collected from District Tuberculosis Centre, Bhavnagar. Data analysis was done manually.

**Results:** Results are as follows.

**Table 1: Outcome Of Shorter Oral MDR Regimen Vs The Age Group Of Patients Enrolled**

Count Of Age	0-20 Years	21-40 Years	41-60 Years	61-80 Years	Grand Total
Cured	2	17	11	2	32
Expired	1	2	1		4
Lost To Follow Up		2	2	2	6
On Treatment	1	8	3		12
Grand Total	4	29	17	4	54

As shown in Table 1, majority of the patients were in the age group of 21-40 years [53%], 33 % in age group of 41-60 years, 7% in the age group

of 0-20 years and 61-80 years each. Of total patients included, 59% were cured, 12% lost to follow up, 7% expired and 22 % are on treatment.

**Table 2: Gender Of The Patient Vs The Age Group Of The Patients Enrolled**

	0-20 Years	21-40 Years	41-60 Years	61-80 Years	Grand Total
Female	3	11	4	0	18
Male	1	18	13	4	36
Grand Total	4	29	17	4	54

As shown in Table 2, 66% of total patients enrolled were male and 33% were female. Majority of the males [50%] were in age group of

21-40 years. Only 16% of the female and 3% of the males enrolled belonged to the age group of 0-20 years.

**Table 3: Resistance Patterns Vs Gender Of The Patients Enrolled**

Resistance Patterns	Female	Male	Grand Total
RIF + INH A	0	1	1
RIF + KAT G	11	17	28
RIF R	7	18	25
Grand Total	18	36	54

As shown in table 3, out of total patients enrolled 52% of the patients had RIF + KAT G resistance, 46% had RIF resistance and only 2% had RIF + INH

A resistance. 62% of the total females enrolled and 47% of the total males enrolled had RIF+ KATG resistance.

**Table 4: Comorbidity [HIV Positivity] Vs Gender Of The Patients Enrolled**

HIV Positive	Female	Male	Grand Total
No	17	35	52
Yes	1	1	2
Grand Total	18	36	54

As shown in table 4, of the total patients enrolled 3% were HIV Positive. Out of which, 50% were males and 50% were females showing no

significant statistical difference between the incidence of HIV and MDR TB between male and female gender.

**Table 5: Comorbidity [Diabetes] Vs Gender Of The Patients Enrolled**

Diabetes	Female	Male	Grand Total
No	17	31	48
Yes	1	5	6
Grand Total	18	36	54

As shown in table 5, 12% of the total patients enrolled were diabetic. Of them, 83% were males and 17% were females.

This study included 54 patients. Out of the total patients enrolled, 66% [36] were male and 33% [18] were female. Appropriate data was collected in regards of sputum AFB, CBNAAT, resistance patterns, age, gender and comorbidities such as diabetes and HIV from a reliable source.

Majority of the patients belonged to the age group of 21-40 years [53%] and least number of the patient belonged to the age group of 0-20 years [7%].

Patients were evaluated in terms of outcome of shorter oral bedaquiline regimen containing treatment and were divided into following groups based on outcome: Cured, Expired, Lost to follow up and On Treatment.

Based on the data analysis, of total patients included, 59% were cured, 12% lost to follow up, 7% expired and 22 % are on treatment.

This is indicative of 59% cure rate with shorter oral BDQ regimen.

In terms of resistance pattern, 52% had RIF + KAT G resistance, 46% had RIF resistance and 2% had RIF + INH A resistance. Of the total patients enrolled 3% were HIV Positive.

Out of which, 50% were males and 50% were females showing no significant statistical difference between the incidence of HIV and MDR TB between male and female gender.

12% of the total patients enrolled were diabetic. Of them, 83% were males and 17% were females.

**Discussion and Conclusion:** For many years, RR-TB treatment lasted 18 months or longer. Such long regimens [all oral longer regimen] were poorly tolerated and resulted in unsatisfactory treatment success (WHO, 2017). With the rollout of 9–11 -month regimens, global treatment

success is improving, but at a slow pace. In total, 59% of patients who started treatment in 2018 were treated successfully<sup>7</sup>. The current WHO's standardized all-oral 9-11-month STR uses the structure of the regimen piloted in Bangladesh and contains seven drugs.

It relies on FQ (levofloxacin [LFX] or moxifloxacin) and BDQ as core drugs; prothionamide (or ethionamide), isoniazid, ethambutol, pyrazinamide (PZA), and clofazimine (CFZ) are added as companion drugs to increase either bactericidal or sterilizing activity<sup>8</sup>.

After detailed data analysis, we came to conclusion that majority of patients of MDR TB were males and in the age group of 21-40 years.

RIF + KAT G resistance was the most common and RIF + INH A was the least common resistance pattern among the patients evaluated.

Shorter oral BDQ regimen had cure rate of 60%.

However 22 % patients are still on treatment with 3rd month and 6th month sputum showing culture conversion, indicative of much higher success rate among the patients of shorter oral BDQ as compared to all oral longer regimen. Our study had several limitations. 12-month post treatment follow-up results are not yet available to confirm the sustained treatment success.

However, as most patients received about 7 months of TB treatment after conversion, we speculate that relapse will be rare. We can conclude from this study that introduction of shorter oral BDQ regimen has significantly improved compliance as it reduced duration by almost half which ultimately lead to improvement in compliance of the patients and treatment success rate<sup>9</sup>.

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