

## Journal of Advanced Medical and Dental Sciences Research

@Society of Scientific Research and Studies

NLM ID: 101716117

Journal home page: www.jamdsr.com

doi: 10.21276/jamdsr

Index Copernicus value = 85.10

(e) ISSN Online: 2321-9599;

(p) ISSN Print: 2348-6805

# Original Research

## Treatment response in pulmonary tuberculosis patients: An observational study

Dr. Vipin Goyal

Associate professor, Department of Medicine, Ananta Institute of Medical Sciences and Research Center, Rajsamand, Rajasthan, India

### ABSTRACT:

**Background:** Current drug regimens grew out of empiric observations and failure of early clinical strategies. Treating tuberculosis with streptomycin, isoniazid, or pyrazinamide monotherapy in the 1950s and 1960s led to an initial favorable response that was quickly abolished by the emergence of resistance. **Aim of the study:** To evaluate treatment response in pulmonary tuberculosis patients. **Materials and methods:** The study was conducted in the Department of General Medicine of the Medical Institute. A total of 100 patients were studied. Information retrieved from the records includes socio-demographic profile of the patients, date of TB diagnosis and treatment outcome. All the patients underwent DOTS therapy for the treatment of pulmonary TB. **Results:** Mean age of the patients was 46.98 years. Number of male and female patients was 51 and 49 respectively. The number of PTB+ patients was 71 and the number of PTB- patients was 29. Successful treatment outcome was seen in 73% patients. Unsuccessful treatment outcome was seen in 27% patients. **Conclusion:** The treatment response is fairly successful. 29% patients had unsuccessful treatment response. Regular follow up of patients with unsuccessful treatment response and awareness creation through health education for rural patients in the course of treatment is vital.

**Keywords:** TB treatment, isoniazid, treatment outcome.

**Received:** 23/07/2020

**Modified:** 26/09/2020

**Accepted:** 28/09/2020

**Corresponding author:** Dr. Vipin Goyal, Associate professor, Department of Medicine, Ananta Institute of Medical Sciences and Research Center, Rajsamand, Rajasthan, India

**This article may be cited as:** Goyal V. Treatment response in pulmonary tuberculosis patients: An observational study. J Adv Med Dent Sci Res 2020;8(10):130-134.

### Introduction:

Current drug regimens grew out of empiric observations and failure of early clinical strategies. Treating tuberculosis with streptomycin, isoniazid, or pyrazinamide monotherapy in the 1950s and 1960s led to an initial favorable response that was quickly abolished by the emergence of resistance.<sup>1-3</sup> Use of combination therapy led to reduction in the emergence of drug resistance and became the standard for antituberculosis therapy.<sup>4</sup> A related rationale has been a belief that in cavitary tuberculosis, there are thought to be three populations of Mycobacterium tuberculosis: bacilli in log-phase growth, slowly replicating bacilli under acidic conditions, and nonreplicating bacilli under hypoxic conditions.<sup>5</sup> Drugs such as rifampin,

isoniazid, and pyrazinamide are thought to have selective action on each of these populations, making it necessary to use multiple-drug therapy to eradicate all bacilli. Isoniazid is thought to kill bacilli in log-phase growth, whereas pyrazinamide is thought to kill slowly replicating bacilli during the first 2 months of the initial phase of therapy. Rifampin is thought to slowly kill nonreplicating persistent bacilli during the 6 months of therapy, with isoniazid added to prevent resistance during the continuation phase. These very popular concepts were developed to explain observed therapeutic actions of drugs, but have yet to be stated as falsifiable hypotheses and interrogated with use of modern experimental techniques.<sup>6</sup> Hence, the present

study was conducted to evaluate treatment response in pulmonary tuberculosis patients.

**Materials and methods:**

The study was conducted in the Department of General Medicine of the Medical Institute. The ethical clearance for the study was obtained from the ethical board of the institute prior to commencement of the study. For the study, we retrospectively viewed the medical records of the TB patients reporting at TB clinic of the medical hospital. A total of 100 patients were studied. Information retrieved from the records includes socio-demographic profile of the patients, date of TB diagnosis and treatment outcome. All the patients underwent DOTS therapy for the treatment of pulmonary TB. Data were collected in data collection format prepared for this purpose. In our study, smear-positive pulmonary TB (PTB+) was defined as patients with at least two positive sputum specimens for acid fast bacilli (AFB) by microscopy. Smear-negative pulmonary TB (PTB-) was defined as patients with symptoms suggestive of TB, with at least two sputum specimens which were negative for AFB by microscopy, and with chest radiographic abnormalities consistent with active PTB. The treatment outcome was categorized according to WHO as successful outcome and unsuccessful outcome. Success outcome was

defined as cured TB patients (negative smear microscopy at the end of treatment and on at least one previous follow-up test) or completed treatment with resolution of symptoms. Unsuccessful outcome was defined as treatment failure (remaining smear-positive after 5 months of treatment), defaulted (patients who interrupted their treatment for two consecutive months or more after registration), or died.

The statistical analysis of the data was done using SPSS version 20.0 for windows. The Student’s t-test and Chi-square test were used to check the significance of the data. The p-value less than 0.05 was predetermined as statistically significant.

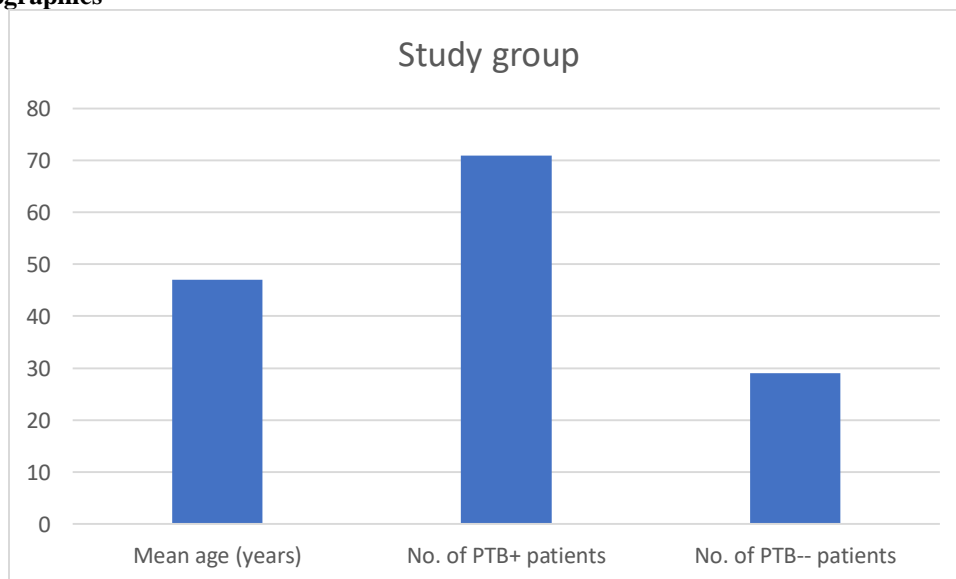
**Results:**

A total of 100 TB patients were studied. Table 1 shows the demographic data of the patients. Mean age of the patients was 46.98 years. Number of male and female patients was 51 and 49 respectively. The number of PTB+ patients was 71 and the number of PTB- patients was 29. Table 2 shows the treatment outcome of TB patients. Successful treatment outcome was seen in 73% patients. Unsuccessful treatment outcome was seen in 27% patients. 7% patients were defaulted, 12 % died and 8% patients had treatment failure. On comparing the results were found to be statistically significant (p<0.05)[Fig 1 and 2].

**Table 1: Demographic data of the patients**

Parameters	Study group
Mean age (years)	46.98
Male/Female patients	51/49
No. of PTB+ patients	71
No. of PTB- patients	29

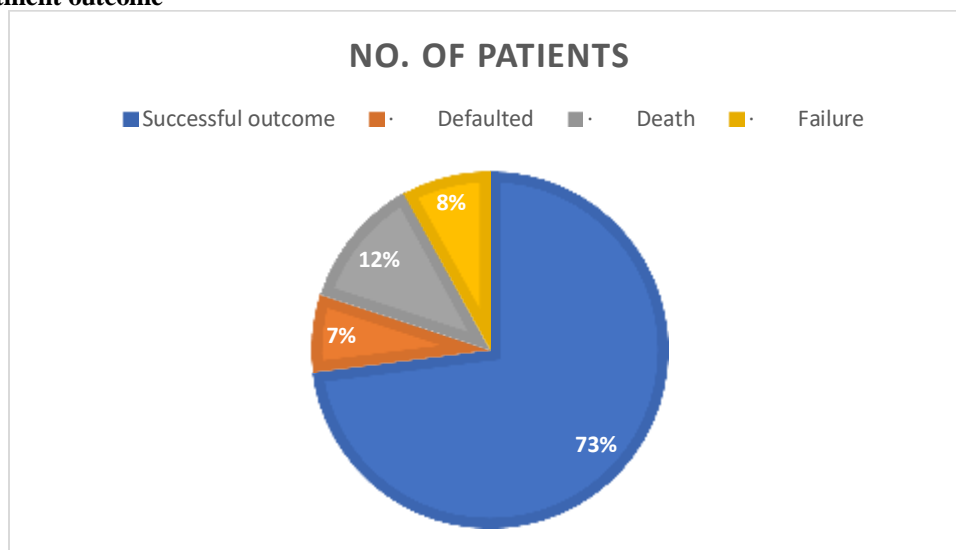
**Fig 1: Demographics**



**Table 2: Treatment outcome of TB patients**

Treatment outcome	No. of patients	p-value
Successful outcome	73 (73%)	0.02
Unsuccessful outcome		
• Defaulted	7 (7%)	
• Death	12 (12%)	
• Failure	8 (8%)	

**Fig 2: Treatment outcome**



**Discussion:**

In the present study we evaluated treatment response in pulmonary tuberculosis patients. We observed that treatment response was successful in 71% of patients but unsuccessful in 29% patients. The results were statistically significant. The results were compared with previous studies and results were consistent with previous studies. Feleke BE et al assessed time to clinical response, the incidence density for clinical response and determinants of clinical response of tuberculosis (TB) patients in the intensive phases of TB treatment. Prospective cohort study design was implemented. The target population for this study was all patients following the directly observed therapy. Baseline data has been collected during the start of the directly observed TB treatment strategy. They have been collected updated data after the seven days of the baseline data collection, then after every seven days updated data has been collected from each pulmonary and extra pulmonary TB patients. Kaplan Meier curve was used to estimate time to clinical response. Incidence density using person days was used to estimate incidence of clinical response. Cox proportional hazard model was used to identify the predictors of clinical responses. A total of 1608 TB patients were included with a response rate at 99.5%. The mean age of the respondents was 24.5 years

[standard deviation (SD) 14.34 years]. The incidence density for clinical response was 1429/38529 person days. One fourth of the TB patients showed clinical response at day 14, 25% of at day 21 and 75% o at day 31. Predictors of clinical response for TB patients includes: age), type of TB, Previous history of TB, Intestinal parasitic infection, hemoglobin, weight gain, Micronutrient supplementation, male sex. The clinical responses for extra-pulmonary TB patients were slower than pulmonary TB. Deworming and micronutrient supplementation should be considered as the additional TB treatment strategy for TB patients. Djoba Siawaya JF et al investigated the profiles of 30 proinflammatory, anti-inflammatory and angiogenic factors [epidermal growth factor, eotaxin, fractalkine, granulocyte colony-stimulating factor, granulocyte-macrophage colony-stimulating factor, interleukin (IL)-1 $\alpha$ , IL-1 $\beta$ , IL-1ra, IL-2, IL-4, IL-5, IL-6, IL-7, IL-8, IL-10, IL-12p40, IL-12p70, IL-13, IL-15, IL-17, interferon- $\gamma$ , interferon-inducible protein-10, Krebs von den Lungen-6, monocyte chemotactic protein-1, macrophage inflammatory protein (MIP)-1 $\alpha$ , MIP-1 $\beta$ , sCD40L, transforming growth factor- $\alpha$ , tumour necrosis factor- $\alpha$  and vascular endothelial growth factor] in the plasma of 12 healthy tuberculin skin test-positive community controls and 20 human immunodeficiency virus-negative patients with active tuberculosis (TB) and

identified potential biomarkers for early treatment response. We showed differences in the level of circulating cytokines between healthy controls and TB patients, but also between fast responders and slow responders to anti-tuberculosis treatment. The general discriminant analysis based on pre-treatment and week 1 measurements identified 10 sets of three-variable models that could classify fast and slow responders with up to 83% accuracy. Overall, this study shows the potential of cytokines as indicators of anti-tuberculosis treatment response.<sup>7,8</sup>

Abebe G et al investigated the treatment outcome and associated factors with an unsuccessful outcome at Jimma University Medical Center (JUMC), Southwest Ethiopia. A 5-year retrospective analytical study, including all types of TB cases who sought care at JUMC between September 1, 2012, and August 31, 2017, was conducted. Treatment outcomes and TB types were categorized according to the National TB Control guideline. Bivariate analysis was used to analyze the association between treatment outcome and potential variables. Overall data from 1249 patients' records were included in the study. The proportion of male patients was higher (815, 65.3%) than that of females. The mean age ( $\pm$  standard deviation, range) of the cases was 26 ( $\pm$ 11.6, 1-71) years. Of the total, 292 (23.3%) were smear-positive pulmonary TB (PTB), 489 (39.2%) smear-negative PTB, and 468 (37.5%) extra-PTB (EPTB) cases. Available treatment outcomes indicate that 253 (20.2%) were cured, 850 (68.0%) completed therapy, 58 (4.8%) died, 83 (6.6%) defaulted, and 5 (0.4%) failed the therapy. About 76 (5.6%) cases were transferred out and 44 (3.2%) cases were lost to follow-up. In total, 146 (11.7%) patients had an unsuccessful outcome. Unsuccessful treatment outcome was associated with smear-negative PTB, EPTB, and unknown human immunodeficiency virus (HIV) status. They concluded that the treatment success rate of overall TB patients is lower than end TB Strategy target of  $\geq 90\%$  success rate. Smear-negative PTB, EPTB cases, and those with unknown HIV status tend to have unsuccessful outcome. Gebrezgabiher G et al determined the treatment outcome of TB patients and investigate factors associated with unsuccessful outcome at Dilla University Referral Hospital, southern Ethiopia. Five years TB record of TB clinic of the hospital was reviewed. A total 1537 registered TB patients with complete information were included. Of these, 942 were male, 1015 were from rural areas, 544 were smear positive pulmonary TB (PTB+), 816 were smear negative pulmonary TB (PTB-) and 177 were extra pulmonary TB (EPTB) patients. Records of the 1537 TB patients showed that 181 (11.8%) were cured, 1129(73.5%) completed treatment, 171 (11.1%) defaulted, 52 (3.4%) died and 4 (0.3%) had treatment failure. The overall mean treatment success rate of the

TB patients was 85.2%. The treatment success rate of the TB patients increased from 80.5% in September 2008-August 2009 to 84.8% in September 2012-May 2013. Tuberculosis type, age, residence and year of treatment were significantly associated with unsuccessful treatment outcome. The risk of unsuccessful outcome was significantly higher among TB patients from rural areas compared to their urban counterparts. Unsuccessful treatment outcome was also observed in PTB- patients and EPTB compared to the PTB+ patients. In conclusion, it appears that DOTS have improved treatment success in the hospital during five years. Regular follow-up of patients with poor treatment outcome and provision of health information on TB treatment to patients from rural area is recommended.<sup>9,10</sup>

### Conclusion:

Within the limitations of the present study, it can be concluded that the treatment response is fairly successful. 29% patients had unsuccessful treatment response. Regular follow up of patients with unsuccessful treatment response and awareness creation through health education for rural patients in the course of treatment is vital.

### References:

1. Streptomycin in Tuberculosis Trials Committee of the Medical Research Council. Streptomycin treatment of pulmonary tuberculosis: a medical research council investigation. *Br Med J.* 1948;2:769–82.
2. Selkon JB, Devadatta S, Kulkarni KG, et al. The emergence of isoniazid-resistant cultures in patients with pulmonary tuberculosis during treatment with isoniazid alone or isoniazid plus PAS. *Bull World Health Organ.* 1964;31:273–94.
3. Yeager RL, Munroe WG, Dessau FI. Pyrazinamide (aldinamide) in the treatment of pulmonary tuberculosis. *Am Rev Tuberc.* 1952;65:523–46.
4. Streptomycin in Tuberculosis Trials Committee of the Medical Research Council, the British Tuberculosis Association Research Committee. Treatment of pulmonary tuberculosis with streptomycin and para-aminosalicylic acid: a Medical Research Council investigation. *Br Med J.* 1950;2:1073–85.
5. Medical Research Council. Prevention of streptomycin resistance by combined chemotherapy; a Medical Research Council investigation. *Br Med J.* 1952;1:1157–62.
6. Tuberculosis Chemotherapy Trials Committee of the Medical Research Council. Isoniazid in combination with streptomycin or with P.A.S. in the treatment of pulmonary tuberculosis: fifth report to the Medical Research Council by their tuberculosis chemotherapy trials committee. *Br Med J.* 1953;2:1005–14.
7. Feleke BE, Alene GD, Feleke TE, Motebaynora Y, Biadlegne F. Clinical response of tuberculosis patients, a prospective cohort study. *PLoS One.*

- 2018;13(1):e0190207. Published 2018 Jan 2. doi:10.1371/journal.pone.0190207
8. Djoba Siawaya JF, Beyers N, van Helden P, Walzl G. Differential cytokine secretion and early treatment response in patients with pulmonary tuberculosis. *Clin Exp Immunol.* 2009;156(1):69-77. doi:10.1111/j.1365-2249.2009.03875.x
  9. Abebe G, Bonsa Z, Kebede W. Treatment outcomes and associated factors in tuberculosis patients at Jimma University Medical Center: A 5-year retrospective study. *Int J Mycobacteriol.* 2019 Jan-Mar;8(1):35-41. doi: 10.4103/ijmy.ijmy\_177\_18. PMID: 30860177.
  10. Gebrezgabiher G, Romha G, Ejeta E, Asebe G, Zemene E, Ameni G. Treatment Outcome of Tuberculosis Patients under Directly Observed Treatment Short Course and Factors Affecting Outcome in Southern Ethiopia: A Five-Year Retrospective Study. *PLoS One.* 2016 Feb 26;11(2):e0150560. doi: 10.1371/journal.pone.0150560. PMID: 26918458; PMCID: PMC4769218.