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EVALUATION OF FACTORS ASSOCIATED WITH ACCEPTANCE OF ADHERENCE AND TOXICITY LEVELS IN THE TREATMENT OF TUBERCULOSIS INFECTION AND EFFECTIVENESS OF THE TREATMENT

P. Lazaru*, J. N. Suresh Kumar, G. Pavani Reddy, M. Bindu Madhavi, Sk. Amina, CH. Ravi Kumar and S. Vamsi

Department of Pharmacy Practice, Narasaraopeta Institute of Pharmaceutical Sciences, Kotappakonda road, Yallamanda, Narasaraopeta, Palnadu, Andhra Pradesh, India

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Abstract

Tuberculosis treatment remains a challenge due to the need to consider, when approaching it, the context of individual and collective health. In addition, social and economic issues have been shown to be variables that need to be considered when it comes to treatment effectiveness. In a small proportion of cases, the bacillus is transmitted to humans from infected cows through drinking non-sterilized milk. This mode of transmission plays only a minor role in the natural history of the disease in humans. This study explores factors influencing acceptance of adherence and toxicity levels in tuberculosis treatment, aiming to assess their impact on treatment effectiveness. Through comprehensive evaluation, aim to identify key variables contributing to patient compliance and potential barriers to successful outcomes, shedding light on optimizing tuberculosis treatment strategies.

Keywords: Tuberculosis Introduction, Adherence, Toxicity, Treatment

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*Corresponding Author

P. Lazaru

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Introduction

Tuberculosis is a fatal disease that is transmitted through air and is caused by mycobacterium tuberculosis that generally affects the pulmonary portion of the human body and leading to severe coughing, fever and chest pain. Tuberculosis can affect any organ in the body. Pulmonary tuberculosis is the most frequent site of involvement; extrapulmonary tuberculosis is less frequent. Only pulmonary tuberculosis is infectious. Tuberculosis (TB) remains a leading infectious killer globally. In contrast, TB remains out of control in many developing countries—to the point that one-third of the world's population currently is infected.¹ Estimates suggest that 1 person dies of TB in India each minute (Times of India, August 29, 2003). *M. tuberculosis* preferentially infects humans, and the closely related *M. bovis* causes a similar disease in cattle and other livestock. Although uncommon today, humans frequently developed TB by drinking milk

contaminated with *M. Bovid*—a threat that spurred the development of pasteurization. Today, airborne *M. tuberculosis* is the main threat to humans. Evidence of TB has been found in ancient human remains, and ancient texts describe it [1–3]. TB commonly was known as —consumption.

Factors Associated With Adherence to Tuberculosis Treatment

Patient related factors

The evidence linking demographic characteristics such as age, race, gender, educational level, and socioeconomic status is inconsistent. However, certain other patient-related variables have been associated with adherence behaviour. These include:

- Knowledge about treatment regimens.
- Patient perception of benefits derived from therapy and barriers to treatment.
- Socio-demographic factors, including homelessness, mental illness, lack of social support, and higher number of life stressors.
- Specific cultural beliefs about medication taking, disease transmission, and disease progression which can also influence medication-taking behaviour.

Physical Factors

- Visual impairment
- Hearing impairment

- Cognitive impairment
- Impaired mobility or dexterity
- Swallowing problems

Psychological/Behavioural Factors

- Knowledge about disease
- Perceived risk/susceptibility to disease
- Understanding reason medication is needed
- Expectations or attitudes toward treatment
- Perceived benefit of treatment
- Confidence in ability to follow treatment regimen
- Motivation
- Fear of possible adverse effects
- Fear of dependence
- Feeling stigmatized by the disease
- Frustration with health care providers
- Psychosocial stress, anxiety, anger
- Alcohol or substance abuse

Provider characteristics

May influence the quality of patient-provider relationships and thus have an impact on patient behavior. In particular:

- The quality of physicians' interpersonal skills has been shown to affect adherence.
- Positive outcomes may be more likely when physicians make efforts to explain treatment regimens and address patient concerns
- Increased nonadherence has been noted in situations where doctors appear insensitive, use medical jargon, view patients as complainers, or do not provide clear messages about the cause of the illness or reasons for treatment.

Clinic facilities

Affect patients' access to care and therefore can impact on adherence. Important factors that may hinder adherence are:

- Long waiting times before appointments.
- Inconvenient clinic hours.
- Lengthy delays between initial contact and follow up appointments.
- Substantial travel costs.

Characteristics of treatment regimens

Can also affect patients' ability and willingness to adhere to them. Adherence has been shown to decrease with an increase in:

- Number of medications, frequency of dosing, and complexity of regimen.
- Duration of regimen.
- Side effects.
- Special instructions, such as dietary change.

Disease characteristics

Have also been shown to influence adherence. Nonadherence may be more common among patients with:

- Chronic rather than acute illness.
- Greater disability produced by the disease.

- Resolution of disease symptoms, because patients who are no longer symptomatic feel they have no further need for medications.
- decrease in symptom severity
- disappearance of symptoms of patient
- patient with depression may not show the interest to take medication
- patients with pediatric disorder do not take the medication

Toxicity Levels TB Drugs

Isoniazid

LD50 100 mg/kg (Human, oral). Adverse reactions include rash, abnormal liver function tests, hepatitis, peripheral neuropathy, mild central nervous system (CNS) effects. In vivo, Isoniazid reacts with pyridoxal to form a hydrazone, and thus inhibits generation of pyridoxal phosphate. Isoniazid also combines with pyridoxal phosphate; high doses interfere with the coenzyme function of the latter.

Rifampicin

- Rifampicin toxicity refers to the adverse effects caused by the medication rifampicin, commonly used in the treatment of tuberculosis and other bacterial infections. Symptoms of rifampicin toxicity may include liver damage, characterized by jaundice, abdominal pain, and changes in urine color. It's crucial to monitor liver function regularly while taking rifampicin and seek medical attention if experiencing any concerning symptoms.
- Rifampicin toxicity, also known as rifampin toxicity, can manifest in various ways, including liver damage, gastrointestinal disturbances, and skin reactions. Common symptoms may include nausea, vomiting, abdominal pain, jaundice, and rash. Regular monitoring of liver function is crucial while taking rifampicin to detect and manage any potential toxicity. If experiencing any concerning symptoms, it's important to consult a healthcare professional promptly.
- Rifampicin toxicity can manifest in various ways, including liver damage, gastrointestinal upset, skin reactions, and flu-like symptoms. It's important to monitor liver function regularly while on rifampicin therapy, as it can cause elevated liver enzymes and, in rare cases, severe liver injury. If experiencing any concerning symptoms while taking rifampicin, it's crucial to seek medical attention promptly.
- Rifampicin toxicity, also known as rifampin toxicity, can occur when there's an excessive buildup of the medication rifampicin in the body. Symptoms may include liver damage, gastrointestinal upset, flu-like symptoms, and rarely, a condition called rifampicin-induced thrombocytopenia. Monitoring liver function is crucial while on rifampicin therapy, and any concerning symptoms should be reported to a healthcare provider promptly.
- Rifampicin toxicity can manifest in various ways, including liver damage, gastrointestinal disturbances

- like nausea and vomiting, skin rash, and flu-like symptoms. It can also cause drug interactions due to its potent enzyme-inducing properties, affecting the metabolism of other medications. Monitoring liver function and being aware of potential drug interactions are crucial when using rifampicin

Pyrazinamide (Z)

- Pyrazinamide toxicity refers to the adverse effects caused by the medication pyrazinamide, which is commonly used in combination therapy for tuberculosis. Symptoms of pyrazinamide toxicity may include liver toxicity, gastrointestinal disturbances, joint pain, and skin rash. Regular monitoring of liver function is recommended while taking pyrazinamide to detect any signs of toxicity early.
- Pyrazinamide toxicity can manifest as liver damage, joint pain, and gastrointestinal disturbances, among other symptoms. Regular monitoring of liver function tests is essential while taking pyrazinamide to detect any signs of toxicity early. If experiencing any adverse effects, it's crucial to consult a healthcare provider promptly.
- pyrazinamide toxicity refers to the adverse effects associated with the medication pyrazinamide, often used in the treatment of tuberculosis. Common side effects may include liver toxicity, joint pain, and gastrointestinal disturbances. Regular monitoring of liver function is crucial while taking pyrazinamide to detect and manage any potential toxicity promptly.

Ethambutol

- Ethambutol toxicity can manifest as optic neuritis, resulting in vision changes such as blurred vision, decreased visual acuity, or changes in color perception. Other symptoms may include confusion, headache, and peripheral neuropathy. Monitoring vision regularly while on ethambutol is essential, and any visual changes should be reported to a healthcare provider promptly.
- Ethambutol toxicity refers to the harmful effects of ethambutol, a medication used to treat tuberculosis. Ethambutol toxicity primarily affects the eyes, leading to optic neuropathy and potentially causing vision loss. Symptoms of ethambutol toxicity include changes in vision, such as blurriness, difficulty distinguishing colors, and visual field defects. Regular monitoring of vision is recommended while taking ethambutol to detect any signs of toxicity early.
- Ethambutol toxicity can occur when there's an excessive accumulation of the medication ethambutol in the body. Symptoms may include vision changes, especially affecting color vision, as well as nerve damage and liver problems in severe cases. Monitoring for these symptoms is crucial during treatment with ethambutol, and medical attention should be sought if any adverse effects are experienced

Treatment

Daily FDC Regimen Schedule for Adults

Weight category	Type of cases	Number of tablets to be consumed			Number of tablets to be consumed		
		Intensive phase	Dose in IP	No. of strips in IP	Continuation phase	Dose in CP	No. of strips in CP
		H R Z E (4FDC) 75\150\400\ 275 mg per tab			H R E (3 FDC) 75\150\275mg per tab		
25-34 kg		2	56 doses	4 × 28	2	112 doses	8 × 28
35-49 kg		3	56 doses	6 × 28	3	112 doses	12 × 28
50-64 kg		4	56 doses	8 × 28	4	112 doses	16 × 28
65-75 kg		5	56 doses	10 × 28	5	112 doses	20 × 28
>75 kg*		6	56 doses	12 × 28	6	112 doses	24 × 28

Daily FDC Regimen Schedule for Pediatric (< 18 yrs):

Weight band	Type of case	No. mole of table to be consumed		Dose in IP	3 FDC no. of strips&tabs in IP	No. of table to the consumed		Dose in CP	2 FDC no. Of strips & tabs
		Intensive phase				Continuation phase			
		H R Z (3 FDC) 50\75\150 mg	E 100 mg			H R (2 FDC.P)50\75 mg	E 100 mg		
4-7 kg		1	1	56	2 × 28 E-56	1	1	112	4 ×28 E-112
8-11 kg		2	2	56	4 × 28 E-112	2	2	112	8×28 E- 228
12-15kg		3	3	56	6 × 28 E-168	3	3	112	12×28 E-336
16-24kg		4	4	56	8 × 28 E-224	4	4	112	16×28 E-448
25-29kg		3 + 1 A	3	56	6 × 28 E-168 A-56	3 + 1 A	3	112	12×28 E-336 A-112
30-39kg		2 + 2 A	2	56	4 × 28 E-112 A-112	2 + 2 A	2	112	8×28 E-224 A-224

Results

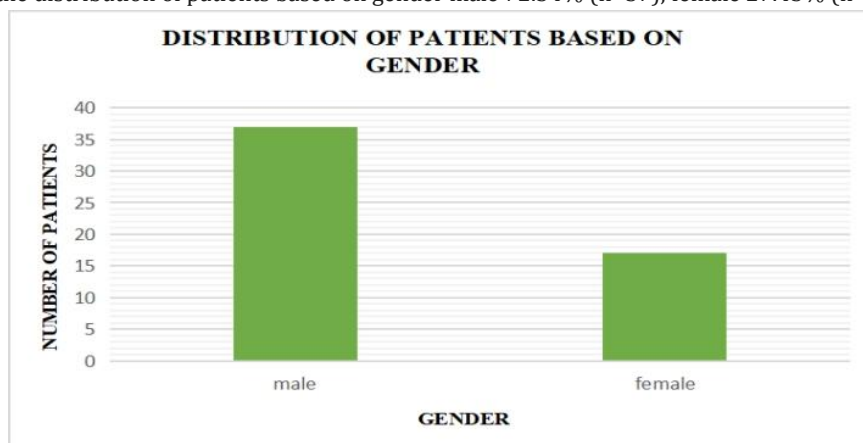
A total number of 51 TB positive cases selected.

A. Distribution of patients based on gender

Table 1: Distribution of patients based on gender

Gender	Number of patients
Male	37
Female	14

Table 01 shows the distribution of patients based on gender male 72.54% (n=37), female 27.45% (n=14).

**Fig 1: Distribution of patients based on gender**

B. Distribution of patients based on age group

Table 2: Distribution of patients based on age group

AGE	NUMBER OF PATIENTS
21-30	7
31-40	9

41-50	8
51-60	10
61-70	12
71-80	5

Table shows the distribution of patients based on age group 21-30 Table 02 shows the distribution of patients based on age group 21-30 36.42% (n=7), 31-40 39.44%(n=9), 41-50 56.87% (n=8), 51-60 55.5%(n=10), 61-70 54.58% (n=12), 71-80 122.1% (n=5).

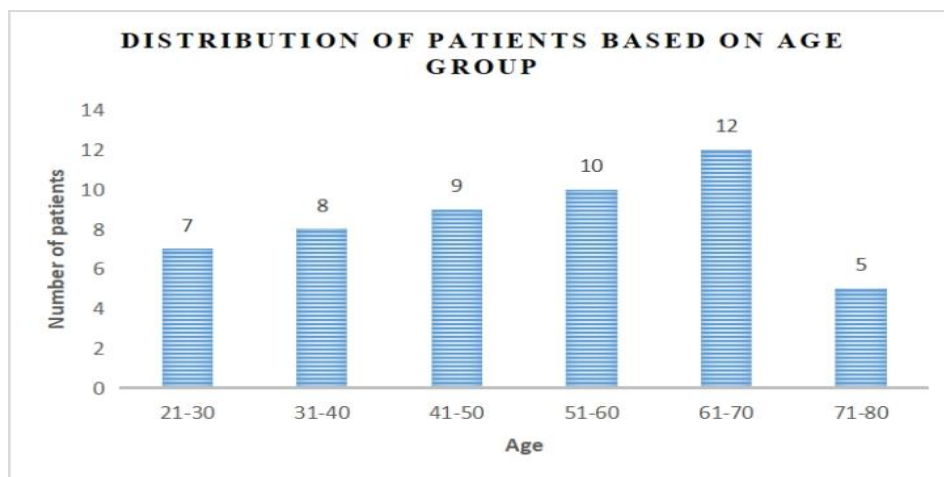


Fig 2: Distribution of patients based on age group:

C. Distribution of patients based on weight

Table 3: Distribution of patients based on weight

Weight	Number of patients
41-50	6
51-60	17
61-70	7
71-80	18
81-90	3

Table 03 shows distribution of patients based on their weight 41-50 11.7%(n=6), 51-60 33.3%(n=17), 61-70 13.72%(n=7), 71-80 35.2%(n=18), 81-90 5.8%(n=3)

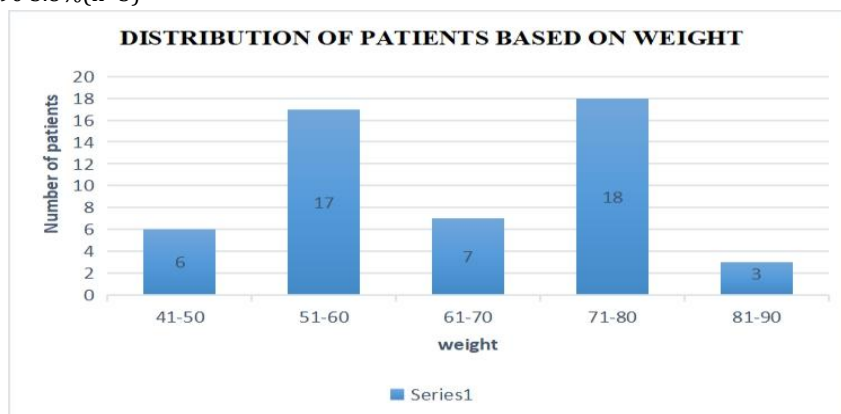


Fig 3: Distribution of patients based on weight:

D. Distribution of patients based on prescribed TB regimen

Table 4: Distribution of patients based on prescribed TB regimen HRZE AND HRE

TB regimen	Number of patients
HRZE	14
HRE	37

Table 04 shows distribution of patients TB regimen HRZE and HRE 72.54% (n=14), HIV with TB 27.45% (n=37).

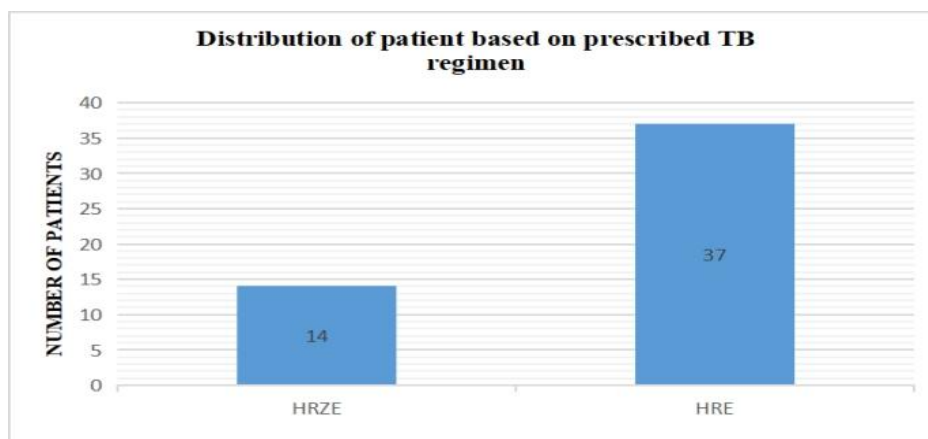


Fig 4: Distribution of patients based on prescribed TB regimen HRZE AND HRE

E. Distribution of patients based on treatment adherence

Table 5: distribution of patients based on treatment adherence

Treatment percentage adherence	Number of patients
61-70%	2
71-80%	3
81-90%	22
90-100%	24

Table 05 shows the distribution of patients based on treatment adherence 60-70% 3.92% (n=2), 71-80% 2.58% (n=3), 81-90% 43.1% (n=22), 91-100% 47.05% (n=24).

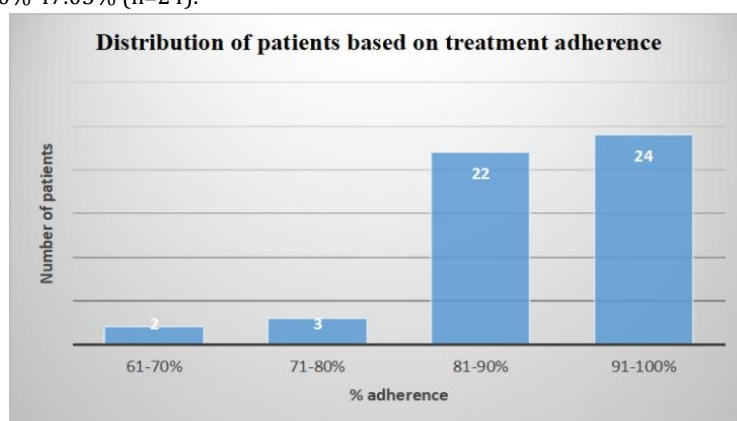


Fig 5: distribution of patients based on treatment adherence

Discussion

We collected a total number of 51 cases TB Patients in TB centre the results of our study concluded that nearly 50% of patients are having improper knowledge in usage of TB regimens. Cessation or improper usage of TB drugs is major reason for improving. So, patients were advised to take TB drugs regularly with proper treatment adherence. In our study we identified that the transmission of TB disease is through pulmonaty, extra pulmonary route only. Patient treatment non adherence to TB regimen will leads to other opportunistic infections. The risk of TB was majorly observed from the age group of 60-70. Adherence percentage after usage of TB regimens was also observed. Among patients are healthy, because of daily usage of TB drugs. Patients with other opportunistic infection like TB were also included. The complications based on treatment vary slightly but the impact of treatment is highly considered in altering the medication to treat the TB

positive patients. Complications were most commonly seen in usage of TB therapy should be include some side effects like nausea, fatigue and trouble sleeping. In our study, we found that the TB Centre play a major role in TB therapy, people who living with TB positive to increase their life period.

Conclusion

A total of 51 patients were collected as a part of this study. In our study we have concluded that most of the patients are adherent in usage of TB regimens. HRZE is present drug of choice used in the treatment of TB infection this regimen is the best in treatment of TB infection. this study, we observed that the major route of transmission of TB in patients is pulmonary and extra pulmonary this study concluded that the most of the TB positive patients in usage of TB regimens are 80% adherent among TB therapy and any irregular usage of TB drugs will leads to

patient opportunistic infection like. Our study finds that some of the patients suffering from side effects like Cough, Coughing up blood or mucus, Chest pain, Pain with breathing or coughing. After observing patients with TB positive, we have noted that the patients who have taken TB drugs regularly with high treatment adherence to their disease have lowered. The results of the study could provide important evidence about of Evaluation of factors associated with acceptance of adherence and toxicity levels in the treatment of tuberculosis infection and effectiveness of the treatment.

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