JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

ASSESSMENT OF TRETEMENT RESPONCES IN ANTIBIOTICS USED IN TRETEMENT OF TUBERCULOSIS FOR PEDIATRIC AND GERIATRIC

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1.Abstract

Mycobacterium tuberculosis, the bacteria that causes tuberculosis (TB), is one of the most common infectious diseases in the world. Treatment and diagnosis of TB remain major public health issues. Ten million people get tuberculosis (TB) every year, and even though it's a preventable and treatable illness, 1.5 million people pass away
TB is a particular problem in the aged population due to the coexistence of multiple causes. aging-related immunodeficiency, the possibility of developing new immunodepressive disorders associated with other comorbidities connected to aging, and possible pharmacological interactions between anti- tuberculosis treatments and other prescriptions. Furthermore, there aren't much particular data on tuberculosis in elderly patients.(1)

Protective barriers raise the risk of tuberculosis (TB) in this age range by compromising microbial clearance systems, decreasing cellular immune responses to M. tuberculosis, and other ways. Furthermore, aged individuals are particularly vulnerable to both new TB infection and the reactivation of latent TB. Diagnosing tuberculosis in the elderly can be difficult; in fact, elderly patients often have nonspecific clinical manifestations or co-morbidities, absent or attenuated fever response, and less common "classical" radiological presentations, which can cause delays in diagnosis. individuals over 65 years of age have a greater death rate than individuals under that age. Indeed, worldwide data from low-incidence nations indicates that almost 80% of deaths involve patients who are older than 65.It has been claimed that up to 51% of older patients die .Even though these death rates have been declining lately, they are still quite high

Keyword- Pediatric, Tuberculosis, Gediatric, Rifampicin, Isoniazid

2.Introduction :-

Tuberculosis-causing mycobacterium Throughout human history, M. tuberculosis infection has been documented. East Africa is thought to be the bacterium's original home. The TB illness traveled with early humans when they left East Africa and settled in Europe and Asia, wreaking havoc across the known world for ages.Tubercular deterioration was observed on the spines of predynastic Egyptian and pre-Columbian Peruvian mummies, which date to approximately 2400 B.C. Greeks from antiquity called the disease "phthisis." Subsequently, for more than a century, the TB virus known as the "Great White Plague" ravaged Europe. During this period, the illness was thought to be nearly always deadly and there was no known cure or effective therapy.

When Hermann Heinrich Robert Koch presented "Die Aetiologia der Tuberculosis" to the Berlin Physiological Society, he made a significant discovery and explained the genesis of tuberculosis. On March 24, 1882, he presented his findings, and in 1905, he was awarded the Nobel Prize. This marked the beginning of a period in which the prevention and treatment of this fatal illness would see unheard-of breakthroughs.Another significant event occurred in 1943 when a lab at Rutgers University in New Jersey produced the antibiotic streptomycin, the first recognized treatment for the infection. The first documented drug study including randomization of participants was a large-scale clinical trial of streptomycin conducted by the British Medical Research Council in 1948. This study established the current standard for methodological randomized, controlled trials. Additionally, it was the first instance of streptomycin resistance in the patients. Two novel anti-tuberculosis medications, paraaminosalicylic acid and thiacetazone, were also introduced to the market in 1948. The administration of streptomycin alongside either of these drugs resulted in a significant improvement in cure rates and a decrease in acquired resistance in the bacteria. (3)

3.History :

Dr. Koch.

Dr. Robert Koch revealed the identification of Mycobacterium tuberculosis, the bacterium that causes tuberculosis (TB), on March 24, 1882. In the United States and Europe, tuberculosis (TB) claimed the lives of one in seven individuals throughout this period. The most significant development in the fight to contain and eradicate this fatal illness was Dr. Koch's discovery. A century later, March 24 was declared World TB Day, an occasion to raise public awareness of the disease's global effects. World TB Day will not be observed as a holiday until tuberculosis is eradicated. However, it is a great chance to inform people about the destruction caused by tuberculosis and the methods for putting an end to it.(4,5)

Through the TB Chronicles, the CDC celebrated TB elimination leaders and history-makers in 2018 as part of the World TB Day theme, "We Can Make History: End TB." The milestones in the TB Chronicles illustrate the progress we have made and the remaining distance to cover in order to eradicate tuberculosis.

3.ANTI-TB AGENTS :

Table 2 – Classification of antituberculosis drugs

First-line anti-TB drugs (basic)	Second-line anti-TB drugs (reserve)	Third-line drugs for special clinical situations
Isoniazid	Protionamide/Ethionamide	Amoxicillin/clavulanate
Rifampicin	Kanamycin	Meropenem
Pyrazinamide	Amikacin	Imipenem
Streptomycin	Capreomycin	Clarithromycin
Ethambutol	Cycloserine	Linezolid
	Rifabutin	
	Para-aminosalicylic acid	
	Fluoroquinolones	
	Bedaquiline	
	Perhlozone	
	Terizidone	

TB = tuberculosis.

Fig no 1: Classification of antituberculosis drugs

Anti-Biotic Drugs In TB:

Tuberculosis (TB) is typically treated with a combination of antibiotics to reduce the risk of developing drug resistance. The antibiotics used to treat TB include:

- Isoniazid (INH)
- Rifampin (RIF)
- Ethambutol (EMB)
- Pyrazinamide (PZA)
- Streptomycin (SM)

These antibiotics are typically used in combination with each other, and the exact regimen and duration of treatment may vary depending on the patient's individual situation, such as their age, overall health, and the severity of their TB infection. It is important to follow the prescribed regimen exactly as directed by a healthcare provider to ensure the best possible outcome.(5)

Aim : Assessment Of Treatment Responses In Antibiotics Used In Treatment Of Tuberculosis For Pediatric And Geriatric

Objective's :

- **Primary Objective's:**

1) To assess the treatment response to anti TB agents in study patient's Retrospective Response

2)To asses the various parameters that had contribute to resistance to antibiotics

➢ **Secondary Objectives:**

1) To assess the impact of variables like age , sex, disease severity on treatment outcomes

2) To analyses the variable factors that can affected the therapy in study patient's (6)

4. Methodology:

Pharmacovigilance is the science and activities related to the detection, assessment, understanding, and prevention of adverse effects or any other drug-related problems. When it comes to antibiotics used in the treatment of tuberculosis for geriatric and pediatric patients, pharmacovigilance plays an important role in ensuring the safety and efficacy of these drug**s**.(6,7)

Disseminate the findings: The findings should be disseminated through peer-reviewed publicationsand Retrospectives responses .

Study population: collecting retrospective response data of 120 patient from karad regions .

Study design: The study design should be selected based on the retrospectives response and study population. A retrospective cohort study could be appropriate for the objective .(12)

Identify the variables: The variables that will be collected should be identified. This may include demographic variables, such as age and sex, disease severity and treatment variablessuch as the type and duration of antibiotic therapy.

Collect the data: Data can be collected from medical recordsand retrospective data . Data can be depending on the study design.

Duration of study : Aug 2022 to Feb 2023 Last 6 month

Analyze the data: Data analysis By observation studies and represent in graph.(8,11)

5. Results:

To assess the variables like age , sex, disease severity .

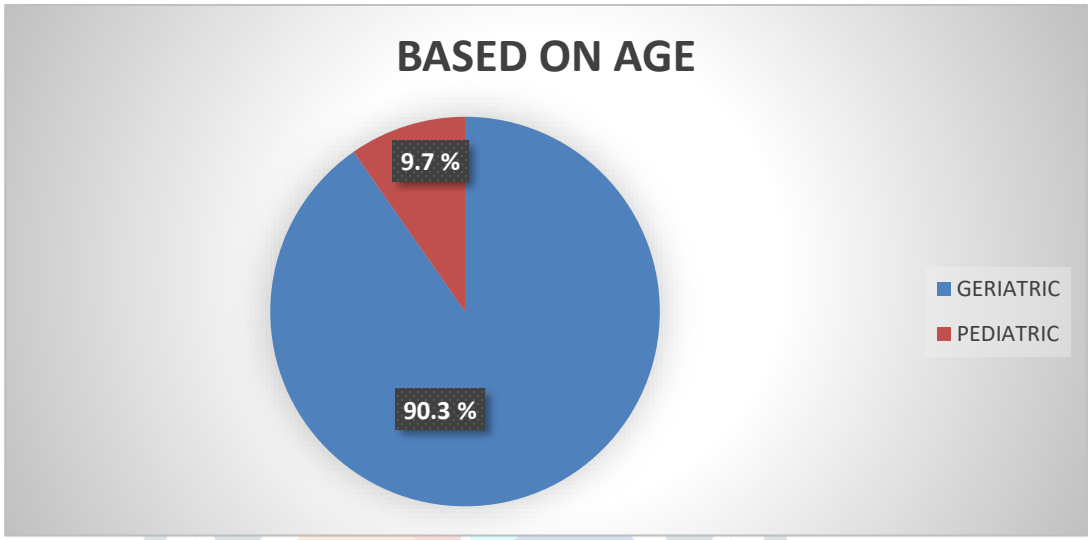


Fig no Age distribute study in retrospectives Responses

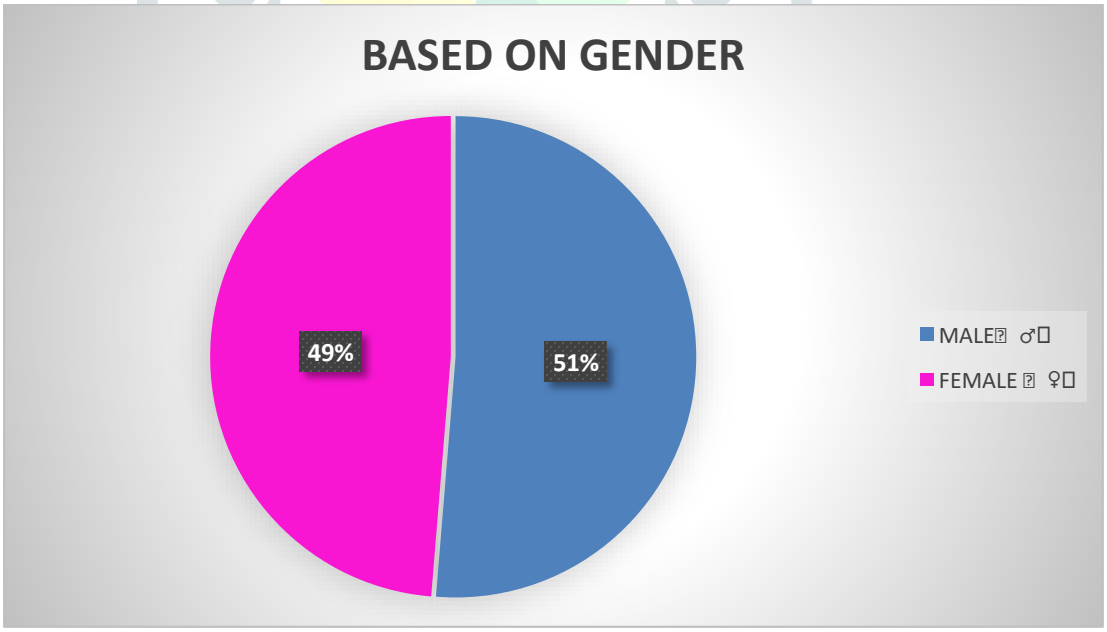


Fig no : 3 Gender distribution study in Retrospective Response

6. Diseases severity :

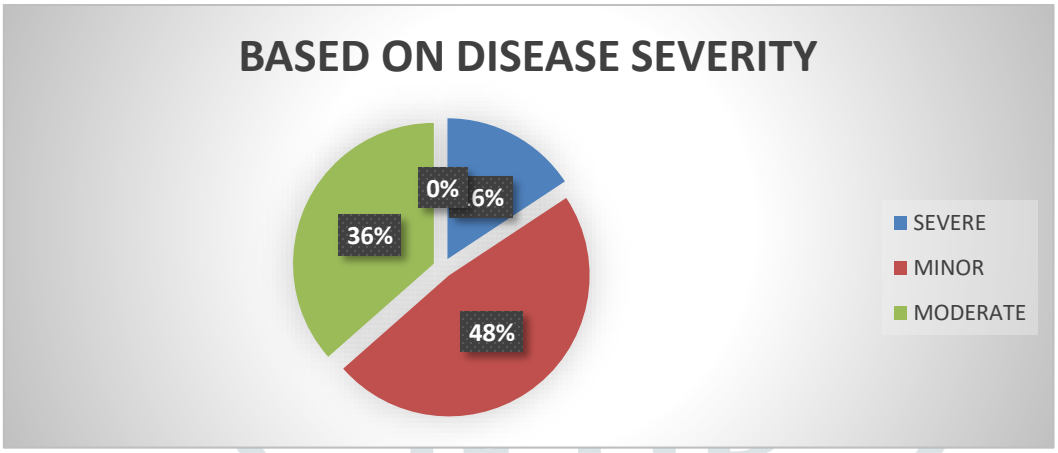


Fig No : 4 Disease severity in Retrospective Response

7.Diagnosis test for TB

NAAT for GERIATRIC

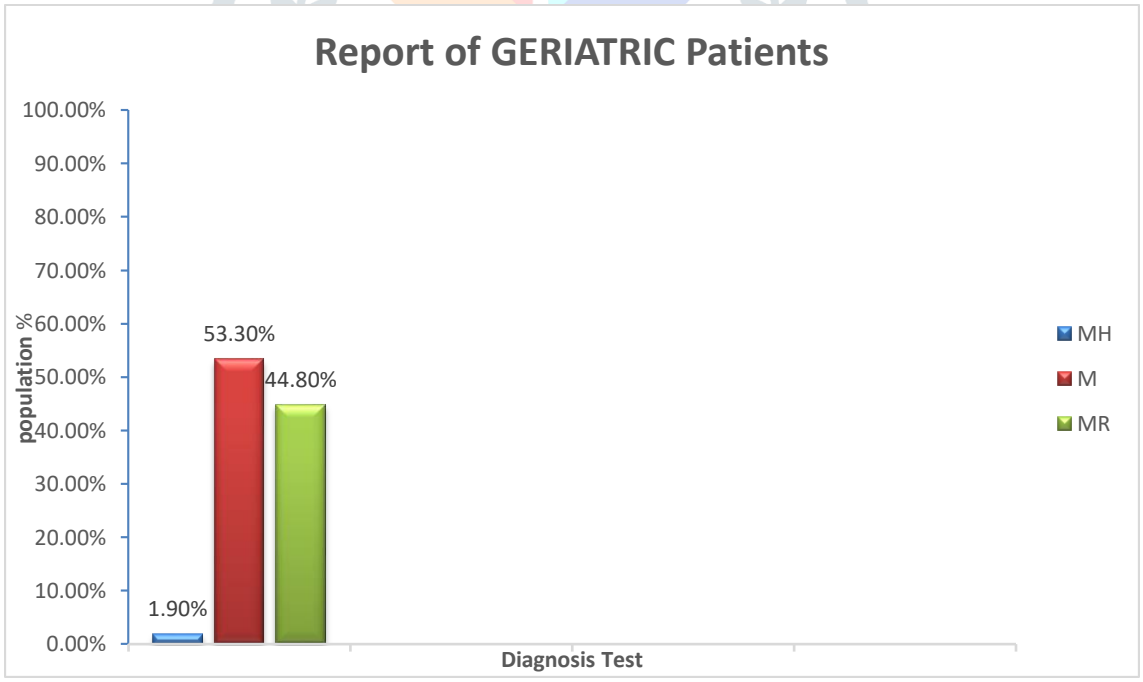


Fig No 5: Report of Diagnosis test in geriatrics patients

Table no-2 Diagnosis test

Diagnosis	Nucleic Acid Amplification Test	Percentage
MH	Mycobacterium Detection HIV detection	1.9 %
M	Mycobacterium Detection	53.30 %
MR	Mycobacterium Detection Rifampicin resistance	44.80%

NAAT For PEDIATRIC

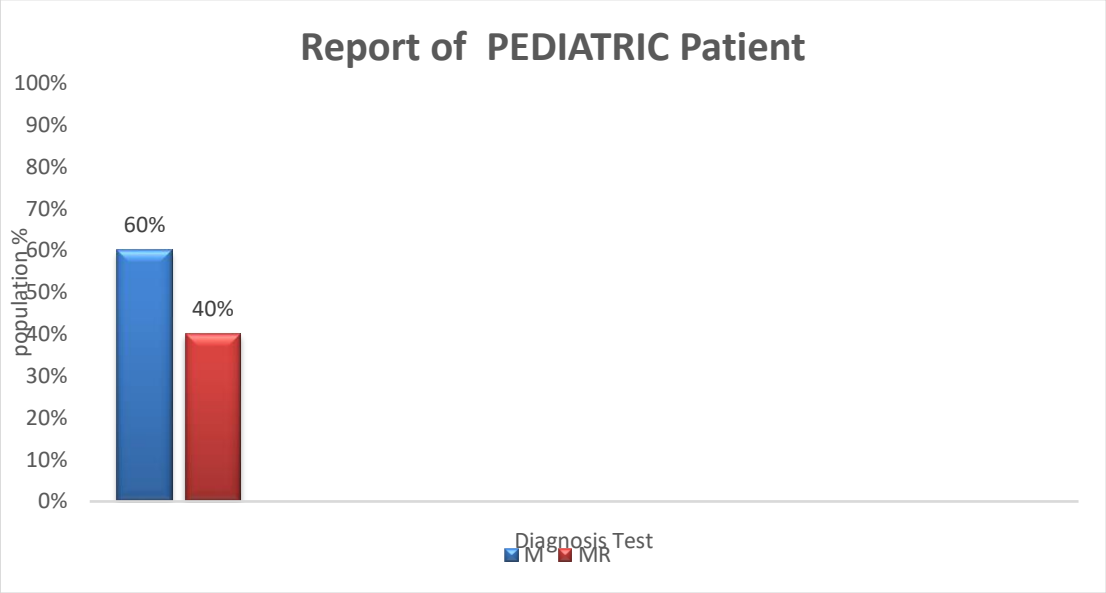


Fig no 5: Report of Diagnosis Test pediatric patients

Diagnosis test	Nucleic Acid Amplification Test	Percentage %
M	Mycobacterium Determination	60%
MR	Mycobacterium Determination Rifampicin Resistance	40 %

Table no-3Diagnosis test

8.Drugs used inTB

- **GERIATRIC**

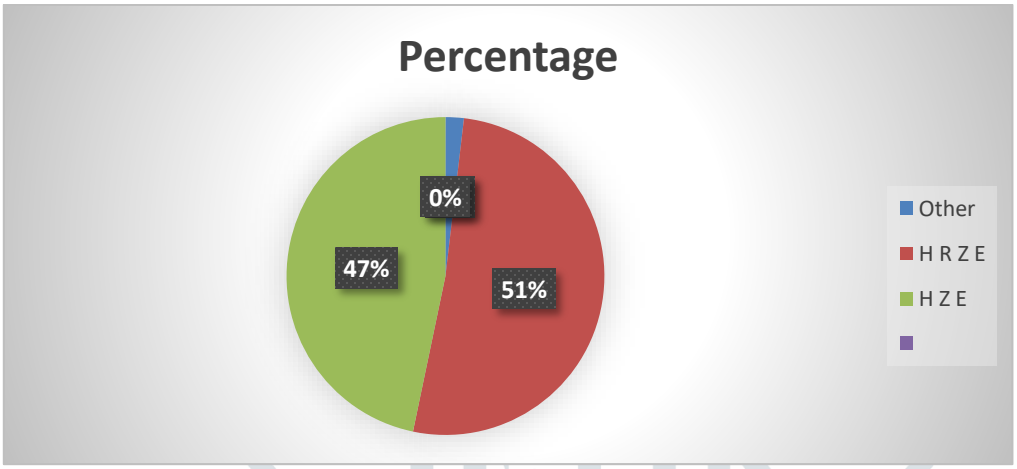
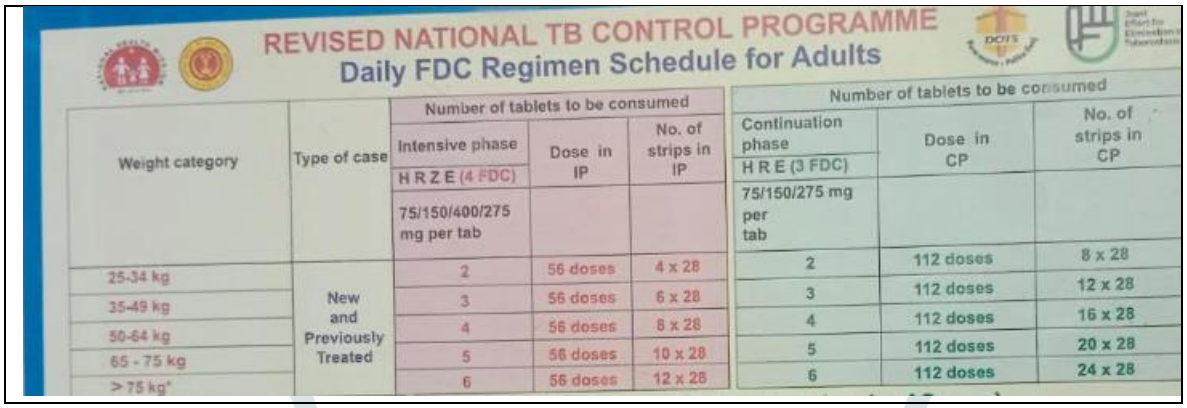


Fig no 6 : Antibiotic Drugs in treatment of Geriatric Patients

Table no-4 Drug and alternative

SR	DRUG	Alternative
H R Z E	Isoniazid Rifampicin Pyrazinamide Ethambutol	Second-line Anti-TB drugs Third -line anti TB drugs
H Z E	If Patient are resistance for Rifampicin Isoniazid Pyrazinamide Ethambutol	Ethionamide 250 mg Cyclomerize USP 250 mg Clofazimine 100 mg Ethambutol IP800 mg Linezolid Tab IP 600 mg Pyrazinamide Tab IP 750 mg
Other	kanamycin Rifabutin Para aminosalicylic acid Protionamide Amikacin	Amoxicillin Meropenem Imipenem Linezolid clarithromycin

9.Fixed Dose combination for Gediatric



REVISED NATIONAL TB CONTROL PROGRAMME

Daily FDC Regimen Schedule for Adults

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

Table no -5 Dose based on weight

Weight Category	Type Of Case	Number of Tablet to be consumed: Intensive Phase H R Z E (4 FDC) 75/150/400/275/ Mg per Tab	Dose in IP	No. of Strip	Number of tablets to be consumed: Continuation Phase H R E (3 FDC) 75/150/275 mg per tab	Dose in CP	No of strips in CP
25-34 kg	New And Previously Treated	2	56 D*	4 X28	2	112 D*	8 X 28
35-49 kg		3	56 D*	6X28	3	112 D*	12 X 28
50-64 kg		4	56 D*	8X28	4	112 D*	16 X28
65-75 kg		5	56 D*	10X28	5	112 D*	20 X 28
>75 kg*		6	56 D*	12X28	6	112 D*	24 X 28

10. PEDIATRIC

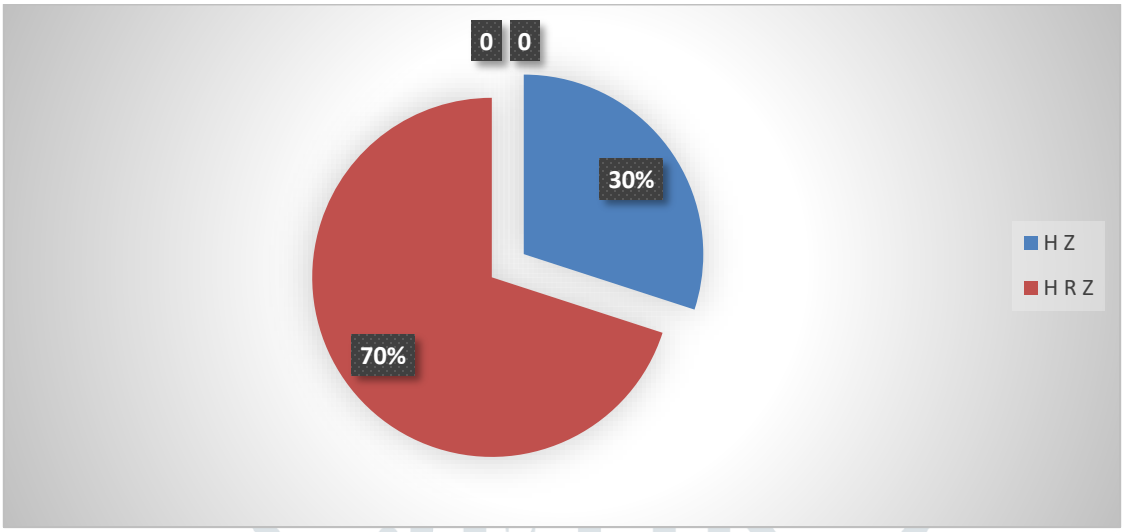


Fig No : 7 Antibiotic drug in treatment of Pediatric Patients

Table no : 6 Drug and Alternative used in TB

SR	Drug		Alternative
H Z	Isoniazid Pyrazinamide		Sonocrysin
H R Z	Isoniazid Pyrazinamide Rifampicin	Ethambutol	Rifampicin

11. Fixed Dose Combination for Pediatric

Weight Band	Type of case	Number of table to be consumed Intensive Phase HRZ (3 FDC-P) 50/75/150mg	Number of table to be consumed Intensive Phase E 100mg	Dose in IP	3 FDC No. of Strips & Tabs in IP	Number of table to be consumed Continuation Phase HR (2 FDC-P) 50/75mg	Number of table to be consumed Continuation Phase E* 100mg	Dose in CP	2 FDC No. of Strips & Tabs in CP
4-7 KG	New and Previously Treated	1	1	56	2 x 28s E - 56	1	1	112	4 x 28 E - 112
8-11 KG		2	2	56	4 x 28s E - 112	2	2	112	8 x 28 E - 224
12-15 KG		3	3	56	6 x 28s E - 168	3	3	112	12 x 28 E - 336
16-24 KG		4	4	56	8 x 28s E - 224	4	4	112	16 x 28 E - 448
25-29 KG		3+1 A*	3	56	6 x 28s E - 168 A - 56	3+1 A*	3	112	12 x 28 E - 336 A - 112
30-39 KG		2+2 A*	2	56	4 x 28s E - 112 A- 112	2+2 A*	2	112	8 x 28 E - 224 A - 224

Table no -7 Dose for Pediatric

Weight Band	Type Of cases	No of Tab. Consumed Intensive Phases		Dose In IP	3 FDC No.of strips and Tabs In IP	No of Tab.consumed Continuation Phases		Dose In CP	2 FDC No of strips and Tabs in CP
		HRZ (3 FDC-P) 50/75/150mg	E 100 mg			HR(2 FDC-p) 50/75mg	E 100 mg		
4-4 KG	New And Previously Treated	1	1	56	2X28s E-56	1	1	112	4 X28 E-112
8-12KG		2	2	56	4 X 28s E-112	2	2	112	8 X 28 E- 224
12-15KG		3	3	56	6X28s E-168	3	3	112	12X28 E-336
16-24KG		4	4	56	8X28s E-224	4	4	112	16X28 E-336 A-112
25-29KG		3+1 A*	3	56	6X28s E-168 A-56	3+ 1 A*	3	112	12X26 E-224 A-224
30-39KG		2+2 A*	2	56	4X28s E-112 A-112	2+2 A*	2	112	8X28 E-224 A-224

12. Discussion:

Tuberculosis (TB) is an infectious disease that is caused by Mycobacterium tuberculosis. The disease can be life-threatening, particularly in vulnerable populations such as children and the elderly. For this reason, it is important to carefully select and administer antibiotics that are effective in treating TB in these patient populations.(11)

In terms of assessing treatment responses, there are several measures that can be used to monitor the effectiveness of the antibiotics in treating TB. These can include monitoring symptoms such as cough, fever, and weight loss, as well as measuring objective outcomes such as bacterial load in sputum or chest X-ray findings. It is important to regularly monitor patients' response to antibiotics to ensure that treatment is effective and to make necessary adjustments if needed.(9,10)

In addition to selecting appropriate antibiotics and monitoring treatment responses, it is also important to consider the potential for drug interactions and adverse effects when administering antibiotics for the treatment of TB. Drug interactions can occur between antibiotics and other medications that the patient may be taking, and can result in reduced effectiveness or increased toxicity of the antibiotics. Adverse effects can also be problematic for patients, particularly those who are already vulnerable due to age or other health conditions.(13,14)

Conclusion-

In conclusion, the selection and administration of antibiotics for the treatment of TB in pediatric and geriatric patients requires careful consideration of several factors, including antibiotic effectiveness, patient tolerance, and potential for drug interactions and adverse effects. Regular monitoring of treatment response is also essential to ensure that treatment is effective and to make necessary adjustments if nedded.

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