Original Research Article

TUBERCULOSIS IN ELDERLY: AN OBSERVATIONAL STUDY ON OUTCOMES AND RESPONSE TO TREATMENT AND COMPARING IT TO THE NON ELDERLY

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ABSTRACT

Background: Recent TB reports worldwide and from India highlight a demographic shift of TB incidence towards the elderly population. The treatment response and tolerance to treatment regimen in elderly population may differ from younger population as tuberculosis in older individuals. This is due to a multitude of factors including age related co morbidity, poor tolerance to drugs, decreased lung function and chronic underlying inflammation due to aging among many others. These distinct presentations have prompted further research to propose treating tuberculosis in the elderly as a distinct entity. **Objectives:** To study the elderly TB population through acceptance and response to treatment and compare it to non-elderly (<60yrs age).

Material and Methods: The study was conducted in a tertiary care centre- in Bareilly, Uttar Pradesh- India .110 elderly and 91 non elderly pulmonary TB(PTB) patients were included in the study. Various treatment acceptance and responses were studied and compared to the young age group.

Results: We observed that the elderly group had a higher incidence of intolerance i.e- 20.91% elderly vs 6.9% adults' experienced drug-induced liver injury, while 12.73% elderly cases showed symptoms of acute kidney injury, 9.09% aging population experienced joint pain, and 25.45% reported tingling sensations. Adult non elderly group reported more gastrointestinal issues (20% vs 10.99%) and vision disturbances (1.82% vs 1.1%).Outcomes for the treatment were mostly favourable and comparable in both the groups. Majority, i.e. 84% elderly and 86% adults resulted in either cure or completion of treatment, while 13 cases (9.09% elderly and 3.3% adults) unfortunately ended in death. Additionally, 4.55% cases were classified as treatment failures in elderly compared to 3.3% adults.

Conclusion: The study reflects a positive acceptance in the majority for standard anti tubercular regimen but reflects a poor drug tolerance in the elderly. Despite this- comparable and favourable treatment completion/ cure rates were seen. It highlights the effectiveness of standard regimen in both the groups and a need for tailored approach in future for the elderly with poor tolerability.

INTRODUCTION

Base on WHO TB Report 2023- The global tuberculosis incidence rate in 2022 was estimated at 133 new cases per 100,000 population per year. Thirty countries with high tuberculosis burden collectively accounted for 87% of all tuberculosis cases, with India alone contributing 27% of the total.[1] According to latest data of WHO, worldwide, approximately 10.6 million individuals had tuberculosis, resulting in 1.3 million deaths attributed to the disease.[2]

The annual incidence of TB in elderly in 2022 was 1,008,060 (age 55-64) and 938,706 (age >65 years old) with total incidence being 1,946,766. In South asian region, total incidence was 880,091 with 497,499 cases (age 55-64) and 400,592 cases (age >65) respectively in different age groups.[1]

Though TB affects all age groups, we see a demographic shift towards an increase of incidence in the elderly. This population has a higher risk of susceptibility as well as mortality associated with the disease. other challenges faced by the aging population include – decreased lung function, immunosenescence, low grade cgronic inflammation related to aging, more frequent drug related side effects, co morbidities and low tolerance to standard ATT.[3,4]

Aims and Objectives

Aim- To study the acceptance and response to NTEP based ds-tb regimen treatment in elderly (age > 60 yrs) and compare it to young (18-60yrs age)

Objectives

1. To assess the response and acceptance to ATT in elderly PTB patients.
2. To compare above variables with non-elderly PTB patients.

MATERIALS AND METHODS

A prospective and observational study was conducted after obtaining approval from the hospital ethical committee and was conducted from August, 2022 to January 2023, over a period of 18 months in a tertiary care centre in India. fulfilling the inclusion and exclusion criteria. The patients were followed up till discharged from the ward.

Inclusion Criteria

- New patients
- Smear positive /CB-NAAT for MTB positive
- Patients with CXR findings suggestive of active PTB
- OPD and IPD patients

Exclusion Criteria

- Retreatment - Including treatment after loss to follow up and failures
- Drug resistant TB
- Patients who were not willing to participate in the study
- Patients less than 18 years of age

Sample Size

Number of patients with Pulmonary TB with Age> 60 years and presenting in OPD & IPD of a tertiary care centre from August 2022 to January 2024.
Methodology
Data was collected using a pre-tested proforma which included their treatment regimen offered, adverse drug reaction and treatment outcomes. Patients with immunocompromised status, malignancy, Recurrence, loss to follow-up and drug resistant (DR) TB were not included. Additional views wherever needed were taken.

Statistical Analysis

The presentation of the Categorical variables was done in the form of number and percentage (%). On the other hand, the quantitative data were presented as the means ± SD and as median with 25th and 75th percentiles (interquartile range). The data normality was checked by using Shapiro-Wilk test.

The following statistical tests were applied for the results

1. The comparison of the variables which were quantitative in nature were analysed using Independent t test.
2. The comparison of the variables which were qualitative in nature were analysed using Chi-Square test. If any cell had an expected value of less than 5 then Fisher's exact test was used.

The data entry was done in the Microsoft EXCEL spreadsheet and the final analysis was done with the use of Statistical Package for Social Sciences (SPSS) software, IBM manufacturer, Chicago, USA, ver 25.0.

For statistical significance, p value of less than 0.05 was considered statistically significant.

Ethical considerations

Prior to the study's initiation, ethical approval was acquired from the institutional ethical committee. All study participants provided their written informed consent. At every stage, privacy and confidentiality were guaranteed.

RESULTS

The study was conducted in a tertiary care centre in india- 110 elderly pulmonary TB(PTB) patients were included in the study along with 91 non elderly patients. All of them were initially initiated on NTEP based drug sensitive regimen based on their weight bands (HRZE for 6 months). Their treatment outcome and intolerance to the regimen was compared.
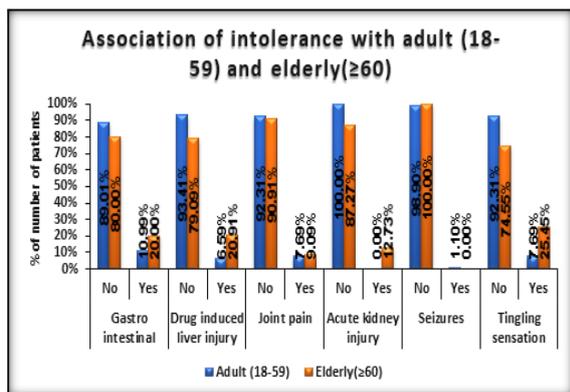
Figure 1.1: Association of intolerance to treatment with adult (18-59) and elderly (≥60)
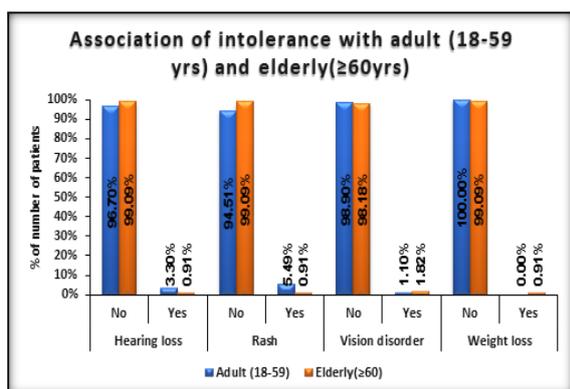

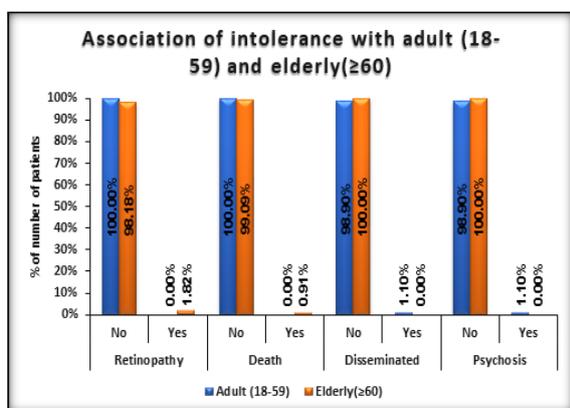**Figure 1.2: Association of intolerance to treatment with adult (18-59) and elderly (≥60)**

Figure 1.3: Association of intolerance with adult (18-59) and elderly (≥60)

The table presents the occurrence of various forms of intolerance among adult and elderly individuals undergoing treatment, along with corresponding p-values indicating statistical significance. Among gastrointestinal issues, 10 (10.99%) adult and 22 (20%) elderly individuals experienced symptoms, showing a trend towards significance (p=0.082). Similarly, for drug-induced liver injury, 6 (6.59%) adult and 23 (20.91%) elderly cases were reported, with a p-value of 0.004, indicating a significant difference. Joint pain was reported in 7 (7.69%) adult and 10 (9.09%) elderly individuals, with no significant difference observed (p=0.723). However, acute kidney injury and tingling sensation was significantly more prevalent in the elderly group, with 14 (12.73%) and 28 (25.45%) cases, compared to 0(0%) and 7(7.69%) respectively in the adult group (p=0.0002, p=0.0009 respectively). Other symptoms, such as hearing loss, rash, vision disorder, weight loss, retinopathy, death, disseminated issues, and psychosis, showed no significant differences between the two groups, with p-value >0.05. (Table1, figure 1.1 to 1.3).
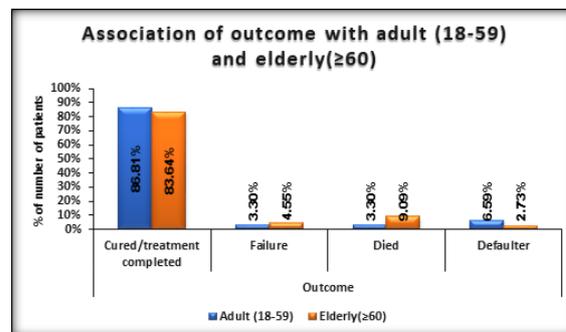

Figure 2: Association of outcome with adult (18-59yrs) and elderly (≥60yrs)

The distribution of treatment outcomes with adult (18-59) and elderly (≥60) individuals was found to be comparable. Among the adult, 86.81% achieved cure or completed treatment, while among the elderly, this figure was 83.64%. Similarly, the rates of treatment failure were 3.30% in the adult and 4.55% in the elderly, and the rates of death were 3.30% in the adult and 9.09% in the elderly. Additionally, the rates of defaulting from treatment were 6.59% in the adult and 2.73% in the elderly. Statistical analysis showed no significant difference between the two age groups regarding treatment outcomes (p value=0.219). (Table 2, figure 2)

Table 1: Association of intolerance with adult (18-59) and elderly (≥60)

Intolerance	Adult (18-59)(n=91)	Elderly (≥60)(n=110)	Total	P value
Gastro intestinal				
No	81 (89.01%)	88 (80%)	169 (84.08%)	0.082†
Yes	10 (10.99%)	22 (20%)	32 (15.92%)	
Drug induced liver injury				
No	85 (93.41%)	87 (79.09%)	172 (85.57%)	0.004†
Yes	6 (6.59%)	23 (20.91%)	29 (14.43%)	
Joint pain				
No	84 (92.31%)	100 (90.91%)	184 (91.54%)	0.723†
Yes	7 (7.69%)	10 (9.09%)	17 (8.46%)	

Acute kidney injury				
No	91 (100%)	96 (87.27%)	187 (93.03%)	0.0002*
Yes	0 (0%)	14 (12.73%)	14 (6.97%)	
Seizures				
No	90 (98.90%)	110 (100%)	200 (99.50%)	0.453*
Yes	1 (1.10%)	0 (0%)	1 (0.50%)	
Tingling sensation				
No	84 (92.31%)	82 (74.55%)	166 (82.59%)	0.0009†
Yes	7 (7.69%)	28 (25.45%)	35 (17.41%)	
Hearing loss				
No	88 (96.70%)	109 (99.09%)	197 (98.01%)	0.33*
Yes	3 (3.30%)	1 (0.91%)	4 (1.99%)	
Rash				
No	86 (94.51%)	109 (99.09%)	195 (97.01%)	0.093*
Yes	5 (5.49%)	1 (0.91%)	6 (2.99%)	
Vision disorder				
No	90 (98.90%)	108 (98.18%)	198 (98.51%)	1*
Yes	1 (1.10%)	2 (1.82%)	3 (1.49%)	
Weight loss				
No	91 (100%)	109 (99.09%)	200 (99.50%)	1*
Yes	0 (0%)	1 (0.91%)	1 (0.50%)	
Retinopathy				
No	91 (100%)	108 (98.18%)	199 (99%)	0.502*
Yes	0 (0%)	2 (1.82%)	2 (1%)	
Death				
No	91 (100%)	109 (99.09%)	200 (99.50%)	1*
Yes	0 (0%)	1 (0.91%)	1 (0.50%)	
Disseminated				
No	90 (98.90%)	110 (100%)	200 (99.50%)	0.453*
Yes	1 (1.10%)	0 (0%)	1 (0.50%)	
Psychosis				
No	90 (98.90%)	110 (100%)	200 (99.50%)	0.453*
Yes	1 (1.10%)	0 (0%)	1 (0.50%)	

Fisher's exact test, † Chi square test

Table 2: Association of outcome of treatment with adult (18-59) and elderly (≥60)

Outcome	Adult (18-59)(n=91)	Elderly (≥60)(n=110)	Total	P value
Cured/treatment completed	79 (86.81%)	92 (83.64%)	171 (85.07%)	0.219*
Failure	3 (3.30%)	5 (4.55%)	8 (3.98%)	
Died	3 (3.30%)	10 (9.09%)	13 (6.47%)	
Defaulter	6 (6.59%)	3 (2.73%)	9 (4.48%)	
Total	91 (100%)	110 (100%)	201 (100%)	

* Fisher's exact test

DISCUSSION

To understand better about the differences in the treatment outcomes and intolerance of TB patients of elderly in comparison to non-elderly, we conducted this study on 110 elderly patients and 91 adults ranged 18 to 59 years were also included.

Due to decreased immune function, a higher prevalence of chronic health conditions, and increased susceptibility to adverse drug reactions from treatments, older adults experience poorer treatment outcomes and higher mortality rates.

Intolerance to treatment

Elderly patients often present challenges related to reduced organ function, such as liver and kidney issues, impacting drug metabolism and increasing the risk of side effects. Adjustments in drug dosages and careful monitoring become paramount. They may also have weaker immune responses, necessitating extended treatment durations and closer monitoring for relapses. In contrast, younger patients generally tolerate standard drug regimens better due to their healthier organ function and robust immune systems. They typically respond faster to treatment, leading to shorter treatment durations, and may require less intensive monitoring. Access to healthcare resources and nutritional support also varies, with elderly patients often facing more challenges in these areas. Tailoring treatment plans to individual patient needs based on age, comorbidities, and social support is essential for successful TB management across different age groups.

Compared to adults, the elderly showed a higher incidence of drug-induced liver injury (20.91% vs 6.59%, p = 0.004) and acute kidney injury (12.73% vs 0%, p = 0.0002), as well as a higher prevalence of tingling sensation (25.45% vs 7.69%, p = 0.0009) and hearing loss (0.91% vs 3.30%, p = 0.33). Conversely, gastrointestinal intolerance (20% vs 10.99%, p = 0.082) and vision disorder (1.82% vs 1.10%, p = 1) were more common in adults than in the elderly.

Among other studies, Shaik et al,[5] reported that side effects observed in elderly patients undergoing anti-TB treatment included nausea and vomiting (14%), renal issues (8%), liver problems (6%), and skin rash (4%). Among non-elderly patients, gastrointestinal symptoms were seen in 4% of cases, with two patients experiencing liver dysfunction, and one patient (2%) showing signs of renal dysfunction.

Kwon YS et al,[6] found no significant differences in adverse effects such as hepatotocixity (3% VS. 5%, p=0.338), Skin rash or itching (8% vs. 9%, p=0.642), gastrointestinal problems (10% vs. 4%, p=0.009), Optic neuropathy (1% vs. 3%, p=0.265) and thrombocytopenia (1% vs. 1%, P=1.0).

Outcomes

Among the cases, 92 (83.64%) resulted in either cure or completion of treatment, while 10 (9.09%) unfortunately ended in death. Additionally, 5 (4.55%) cases were classified as treatment failures, and 3 (2.73%) cases were considered defaulters.

Among other studies, Dhamotharaswamy et al,[7] reported that among 176 patients, 110 (62.5%) patients successfully completed the treatment. 41 patients were cured between treatments (23.29%), and 13 (7.38%) patients died during the course of treatment. Nine patients (5.11%) were lost to follow-up, and 3((1.70%) patients did not respond to the treatment. Yagi M et al,[22] reported that out of 632 elderly patients, TB-related deaths were 68 (10.8%). Wu LI et al,[21] reported that out of 517 adult patients, a third of older adults experienced adverse events.

Compared to adults, the elderly had comparable outcomes in terms of cure/treatment completion (83.64% vs 86.81%, p = 0.219*), failure (4.55% vs 3.30%), death (9.09% vs 3.30%), and defaulters (2.73% vs 6.59%).

Among other studies, in the study by Shaik KU et al,[5,16] out of 50 patients ≥60 years of age 36(72%) were completely cured and out of 50 patients of 18-59 years age, 46 (92%) were cured (P=0.019); 10(20%) and 3(6%) were failure (P= 0.074) and 4(8%) and 1(2%) patients, respectively died (P= 0.074).

Wu IL et al,[8] reported that compared to non-elderly patients, elderly patients had significantly lesser number of patients who completed TB therapy (77.4% vs. 88.4%, P=0.02) and significantly more deaths during TB treatment (16.3% vs. 2.9%, P<0.001). Kwon YS et al,[14] found no significant differences in the terms of favorable outcomes in the elderly and non-elderly patients (97% vs. 94%, P=0.251).

CONCLUSION

We conducted this study to shed some light on the treatment response and outcome in elderly tubercular patients. the study reflects a generally positive acceptance of NTEP-based treatment among elderly patients (80%). Regimen modifications (49.09%) were common due to issues such as drug-induced liver injury (20.91%) and gastrointestinal intolerance (20.00%). Additionally, elderly patients experienced a higher incidence of adverse drug reactions, including drug-induced liver injury and acute kidney injury, alongside neurological symptoms such as tingling sensation. However, gastrointestinal intolerance and vision disorders were more prevalent in adults. Despite these challenges, the study reports favourable outcomes with cure/completion rates reaching 83.64%, comparable to those in the adult population, suggesting that tailored treatment strategies and close monitoring can lead to successful outcomes in elderly TB patients. Notably, treatment failure rates (4.55%) were relatively low, indicating overall effectiveness in managing TB in elderly patients.

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