International Journal of Life Sciences, Biotechnology and Pharma Research Vol. 13, No. 8, August 2024 Online ISSN: 2250-3137
Print ISSN: 2977-0122

DOI: 10.69605/ijlbpr_13.8.2024.116

ORIGINAL RESEARCH

Study of tuberculosis in elderly(age 50years and above) and their treatment outcome under DOTS

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Received Date: 26 June, 2024 Accepted Date: 29 July, 2024

ABSTRACT
Tuberculosis (TB) is an infectious and debilitating disease. It is one of the ten leading causes of death worldwide and the leading cause of death from an infected person. Tuberculosis is very common in the elderly but is often overlooked due to comorbidities and overlapping clinical features. The increasing number of elderly people and the high risk of this age group contracting tuberculosis (TB) is a problem for India. This study aims to estimate the burden of tuberculosis in adults. This is a survey of TB patients over 50 years of age (1) registered with the NTEP of the State Chest and Tuberculosis Departments. Amritsar Medical College. Collect clinical data and review clinical results. Chest x-ray showed consolidation/cavitation in most patients (84%). The overall success rate in this study was 85%, and the return rate of sputum at the end of the intensive phase in patients with phlegm was found to be 91.66%%. The overall failure rate was 8% and the overall mortality rate was 7%.

INTRODUCTION

Tuberculosis (TB) has been aglobal health problem since ancient times and is believed to have emerged 150 million years ago. It has a great impact on the country's economy and production. Tuberculosis is the second leading cause of death from infectious diseases worldwide, after HIV (human immunodeficiency virus). According to the World Tuberculosis Report 2022, 40 million people are living with tuberculosis. The most obvious and immediate impact of the COVID-19 epidemic on tuberculosis is the decrease in new diagnoses and official reports in 2020 compared to 2019. After an increase in tuberculosis patients in 2017, there was a decrease of 18% from 2019 to 2020 i.e.from 7.1 million to 5.8 million.Partial return in 2021, 6.4 million patients were seen. (2)

It is estimated that one-third of the world's population(1.7 billion) is infected with Mycobacterium tuberculosis. 1% of the world's population is infected each year, and most of those affected are in developing countries.Older people are more susceptible to tuberculosis due to comorbidities, malnutrition, chronic alcohol consumption, underlying disease, and antiretroviral drug use. This is also confirmed by the increasing number of TB cases in the elderly (65 years and above) in 2016. Many countries now report a disproportionate increase inthe number of TB cases among the elderlycompared to a growing population(3). Age and socioeconomicfactors have been shown to hurttreatment outcomes in the elderly, increasing their potential for community transmission. (4) India is going through a demographic transition where the population is increasing as life expectancy increases. The population aged 60 and above (the age defined as elderly under Indian law) is increasing, so we can expect tuberculosis among the elderly to also increase. Previous studies conducted in India between 1996 and 2005, which were conducted in tertiary centers or limited to small areas, described poor treatmentin this age group. The relationship between TB type and factors such as HIV infection in elderly TB patients has not been investigated. India's growing elderly populationis expected to constitute 11.1% of total population by 2025(5). According to the India Tuberculosis Report 2022, there is a huge difference in the age distribution of tuberculosis patients in the country. (6) Detection of TB in this high-risk group by screening methods is not technologically or economicallyfeasible forlow- and middle-income countries (LMICs) such as India. At the same time,

DOI: 10.69605/ijlbpr_13.8.2024.116

failure to detect and control these patients could put pressure on the ongoing efforts of the National Tuberculosis Elimination Program (NTEP) to achieve the target of eliminating TB in India by 2025. (7) Evidence-based healthy adults – India now needs adequate treatmentand surveillance for tuberculosis in adults. A better understanding of the epidemiology and treatment of elderly TB patients may help prevent this emerging threat. Although many descriptive studies of adult TB have been conducted worldwide, there is little evidence of data and outcomes among adults and non-human TB patients in India(8). Therefore, we conducted this study to estimate the prevalence and clinical outcomes of TB in elderly patients in GMC, Amritsar.

MATERIALS AND METHODS

This observational study was conducted on 100 TB patients, including outpatients and inpatients, at the Department of Chest and Tuberculosis, Government Medical College, Amritsar.

This study was carried out with the approval of the Amritsar Government Medical College Ethics Committee. Selected patients are 50 years of ageand above. All patients included in the study signed written informed consent.

Patients under the age of 50, patients who did not agree to participate in this study, patients with drug-resistant tuberculosis (DRTB), and patients who lost to follow-up were not included in this study.

Detailed medical history of each patient, including TB symptomssuch as cough, fever, loss of appetite, and weight loss. Difficulty breathing etc. A full body and physical examination was performed.

RESULTS

Patient characteristics:This study was conducted at the Department of Tuberculosis and Respiratory Diseases, Government Medical College, Amritsarto study tuberculosis in adults (50 years and above) andtreatment outcomes under DOTS (Directly Observed Treatment Short Course). For this purpose, 100 patients aged 50 years and above were included with symptoms such as cough, fever, hemoptysis, chest pain, shortness of breath, etc. A detailed history of tuberculosis symptoms such as was taken. Clinical, bacteriological, and radiological tests were performed in this study.

Many facts found in this study include:

Most of the patients in this study were male, 56% and 44% were female. 70 people aged 50-65,while 30 patients age greater than 65(p=0.000, significant). Most of the patients had pneumonia (64%).Most of the patients had pulmonary disease(64%)while 36% had extrapulmonary disease(p=0.00;significant).Out of these 36 extrapulmonary cases, 13 cases are of Pleural tuberculosis, Cold abscess(8%),Tubercular meningitis(5%),Abdominal Tuberculosis(5%),Potts spine(4%), and others(1%) as shown in figure 1.

Most of the patients (78%) were new patients and 22% were recurrent patients. Cough was the main symptom seen in 70% of patients, followed by difficulty breathing (67%), fever (59%), weight loss (54%) loss of appetite (48%), and nonspecific/common symptoms (38%).(as shown in figure 2).Jaundice and cyanosis were seen in 19% and 22% respectively, and 91% of patients had Resonant note on percussion, 9% of patients had dull note on percussion. On Auscultation, 79% of patients have abnormal auscultation, and 21% of patients have normal auscultation. Auscultation is normal on admission.

The majority (77%) of the patients included were anemic while 23% had normal hemoglobin levels according to the standard of 12g/dl in females and 13g/dl in males given by the World Health Organization. Diabetes mellitus was present in 14% of patients followed by hypertension in 8% of patients, COPD in 7% of patients, Asthma in 6% of patients, Cardiovascular disease in 6% of patients, and Dyslipidemia in 4% of patients.

Sputum smear was positive for AFB in 48% of patients before the start of treatment, chest x-ray lesion was present in 84% of patients before the start of treatment.

Sputum for CBNAAT is positive in 24 cases, out of which 13 cases belong to 50-65 years of age group while 11 cases belong to >65 years age group(p=0.346; Non significant) as shown in Table 1.

CBNAAT is positive in 7 Extrapulmonary cases and negative in 2 cases. Out of these 7 positive cases 3 cases 2 cases are detected for Mycobacterium tuberculosis in Pus sample taken from Cold abscess.4 cases are detected for Mycobacterium tuberculosis in pleural fluid analysis.

The majority of patients had relief of symptoms by the end of 3rd month of treatment. In this study,appetite improvement was first to be observed whereas cough was relieved last of all, while breathlessness persisted in 8 patients till the end of treatment.

Sputum conversion rates, observed at the end of the intensive phase, were91.66%. Treatment success rate (cure/completion rates) was 87.14% in the 50-65 years age group and 80% in the>65 years age group(p=0.656; nonsignificant)(Table 2).The overall success rate combining both age groups was 85%.Treatment failure rates observed in the study were 7.14% in the 50-65 years of age group and 10% in the>65 years of age group i.e. 5 cases out of 70 in the 50-65 years of age group and 3 cases out of the total 30 cases in >65 years age group.(as shown in figure 3,Table 2)Radiological improvement at the end of treatment was seen in 83% of cases.

In this study, the overalldeath rate was 5.71% in 50-65years of age group while it was 10% in the>65 years of age group i.e. 4 cases out of 70 in the 50-65 years of age group and 3 cases out of the total 30 cases in >65 years age group(p>0.05; nonsignificant).At the end of treatment clinical

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improvement was seen in 78% of patients with resolution of clinical symptoms andthe majority(64%) of the patients gained weight in the range of 3-5 kg. Nausea/vomiting was the most frequently reported adverse reaction to drugs, present in 7% of cases.

Table 1: Sputum examination before the start of treatment

Sputum status	Total number of patients	50-65years		>65years		
		No. of patients	%age	No. of patients	%age	P Value
Sputum for AFB	48	39	81.2	9	18.7	0.000314 (p<0.001; Significant)
Sputum for CBNAAT	24	13	54.1	11	45.9	0.346 (p>0.05; Not Significant)

Table 2: Clinical outcome at the end of treatment

Age groups (years)	No. of cases (n=100)	Cured (n=100)	Treatment completed (n=100)	Failed (n=100)	Died (n=100)	Cured/ completed (n=100)	'p' value
50-65	70 (70.0%)	40 (57.14%)	21 (30%)	5 (7.14%)	4 (5.71%)	61 (87.14%)	0.656 ($p>0.05^{NS}$)
>65	30 (30.0%)	10 (33.33%)	14 (46.66%)	3 (10%)	3 (10%)	24 (80%)	
Total	100 (100.0%)	50 (50.0%)	35 (35.0%)	8 (8.0%)	7 (7.0%)	85 (85.0%)	

Figure 1: Extra pulmonary cases distribution

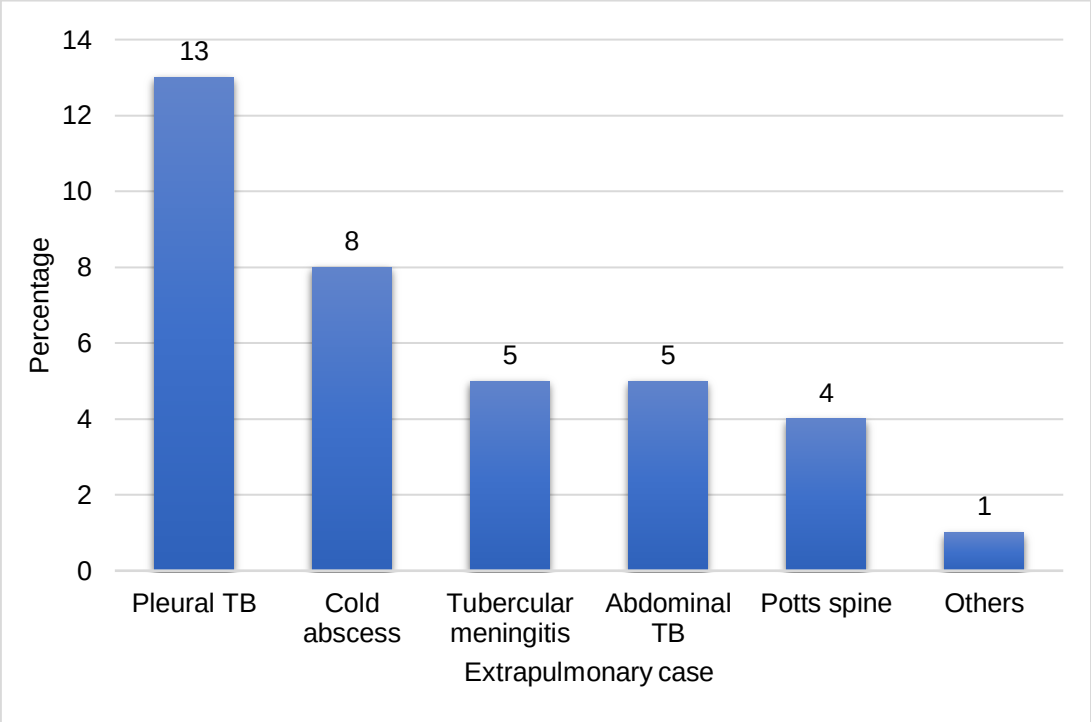

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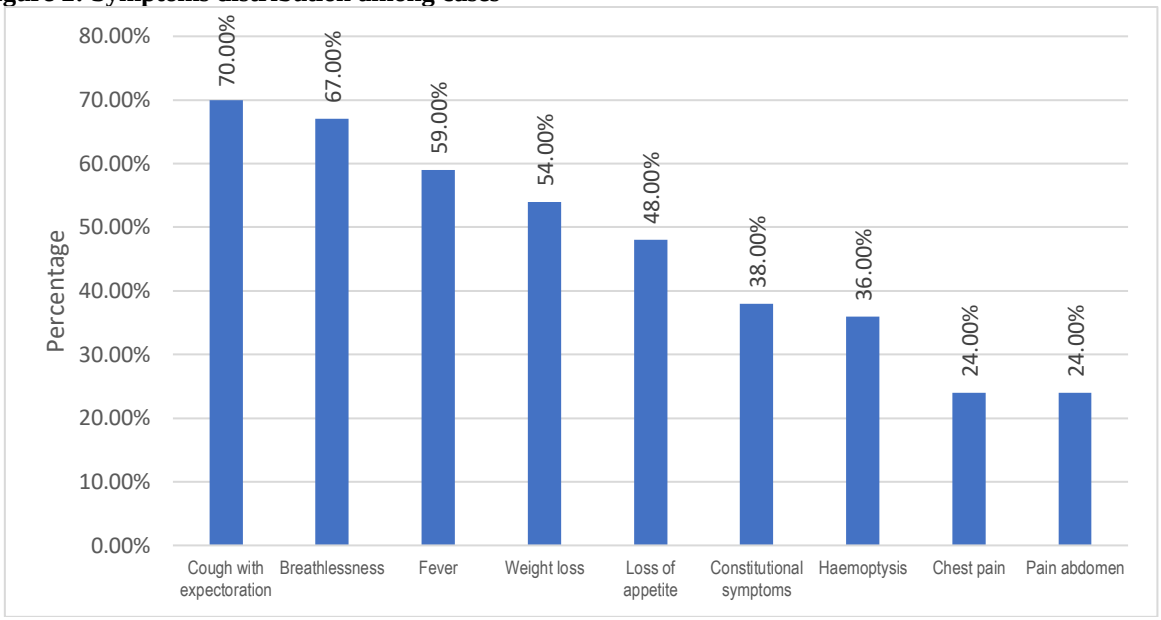
Figure 2: Symptoms distribution among cases



DISCUSSION

The present study was conducted on 100 patients aged 50 years and above who presented to the outpatient department/were admitted to Tuberculosis and Chest Disease Hospital,Govt Medical College, Amritsar.majority of the patients were males(56%) while 44% were females. This is comparable with the study done by Maria Korzeniewska-Kosełaet al which showed that the incidence of tuberculosis was 3 times higher in males as compared to females in Poland(9,10)Almost all such studies conducted in the past have shown a preponderance of males over female cases in the prevalence of Tuberculosis. This male preponderance is thought to be because males have more exposure at work. Also, adverse social factors are found to affect elderly males more severely than females.

In the present study majority of patients were between 50-65 years of age i.e. 70% of cases while 30% of cases were in the> 65 years age group. The maximum age reported in the present study was 85 years. This study is in contrast to a study by Nirmal Chand et al which showed out ofthe 201 patients, 161 were in the 50-65 years group while 40 were >65 years.(10) Majority(64%) of the patients had pulmonary disease, whereas the remaining(36%) had extrapulmonary tuberculosis(P>0.118;not significant) .This finding is comparable with the study done by J. N. Lin et al which observed that in his study out of 766 patients, 14% had extrapulmonary tuberculosis while 86% had pulmonary tuberculosis (11)This finding is comparable with the study by Jim E. Banta et al in which 75.5% had the pulmonary disease while 23.3% had the extrapulmonary disease(12).

Attention was focused on the symptomatology of Tuberculosis.Cough was the main symptom observed in 70% of cases followed by breathlessness(67%),loss of weight (54%), nonspecific/incidental symptoms like dizziness, malaise,general debility, loss of memory,etc(36%),fever(59%), loss of appetite (48%) and hemoptysis in 34% cases.Chest pain and Pain abdomen were observed in 24% of cases. This study is in comparison with the study done by Loren G. Miller et al which showedthat of 313 persons who completed their questionnaire, 72.7% had a cough, 48.2% for >2 weeks, and 52.3% had a fever, 29.4% for >2 weeks.(13)

Breathlessness was reported in 67% of the cases(Figure 2). This finding is comparable with the study done by Nirmal Chand et al which showed breathlessness in 69.15% of cases(10). Weight loss was observed in 54% of cases which was attributed to old age by the patients. This finding is similar to the study conducted by Reinout van Crevelet al showed weight loss in 80% of cases (14) Hemoptysis was observed in 34% of cases.This finding is comparable with previous studies by Arora et al and Vats et al who had reported hemoptysis in 20.6% and 15.2% of patients respectively(15). A total of 14 patients had co-existing Diabetes mellitus, followed by hypertension in 8% and COPD in 7% of patients, Asthma in 6% of patients, Cardiovascular abnormality in 6% of patients, and dyslipidemia in 4% of patients. This finding is comparable to a study done by Francesco Di Gennaro et al., which showed that 68% of patients had at least 1 comorbidity present.The majority of patients (84%) had a lesion in the chest x-ray at the start of treatment.

Out of 64 Pulmonary tuberculosis patients,48 were sputum smear-positive before the start of treatment (Table 1). This finding is comparable with studies by Vats et al who reported sputum smear positivity in 41% (14).

Rest 36 patients are of extrapulmonary tuberculosis which includes 13 patients of pleural effusion (n=36, 36.11%), 8 cases of cervical lymph node TB (n=36,

DOI: 10.69605/ijlbpr_13.8.2024.116

22.22%), and 5 cases of abdominal tuberculosis (n=36, 13.88%),5 cases of Tubercular meningitis (n=36, 13.88%), 4 cases of Pott s spine(n=36,11.11%) and 4 cases of CBNAAT is positive in 7 Extrapulmonary tuberculosis cases and negative in 2 extrapulmonary cases.

Four cases are sputum AFB negative but detected with Mycobacterial tuberculosis on sputum for CBNAAT (gene expert) basis. Seven patients with pulmonary TB having Sputum for AFB negative have extensive parenchymal lesion lesions and symptoms suggestive of tuberculosis diagnosed on a clinical-radiological basis. Five patients were not able to produce sputum so diagnosed on a clinical-radiological basis.

All the patients were treated by Directly Observed Treatment Shortcourse as prescribed under the National Tuberculosis Elimination Program.

The majority of patients were relieved of symptoms by the end of 2nd month of treatment. Appetite improvement was noticed in 34 of 48 patients by the end of the first month of treatment, followed by chest pain in 16 out of 24 patients and cough in 32 out of 70 patients. The cough persisted in some patients till 6 months and was the last symptom to be relieved.

In 8 patients breathlessness persisted till the end of treatment. These patients exhibited extensive parenchymal lesions on chest x-ray.

The sputum conversion rate at the end of the intensive phase was 91.66%. Out of these 48 patients, 39(81.2%) patients belong to the 50-65 years age group while 9(18.7%) patients belong to the >65 years age group($p<0.0001$; significant). This study is comparable to a study done by S. Bawri et al which showed that 84% of patient had their sputum conversion at the end of 2ndmonth($p<0.05$; significant).(17)

Weight gain amongst the patients was found to be in the range of 0-8kg with the majority (64%%) of the patients gaining 3-5kg. 82%% gained weight in the range of 1-5kgs($p<0.00$; significant). This study is comparable to a study done by Rohini K et al which showed weight gain between 3-13% ($p<0.001$; significant) (18)

Out of 100 patients in the study, the treatment success rate Cure/completion rate in the 50-65 years age group was 87.14% % while in the>65 years age group it was 80%% The overall completion rate of this study is 85%($p>0.656$; Nonsignificant)(Table 2). But the study done by Daniel C Oshi et al showed lower treatment success rates of 68.9%($p>0.09$; Nonsignificant)(19). Nyemike Simeon Awunor et al in the study showed a treatment success rate of 88.7%($p>0.6$; Nonsignificant)(20)These results are also comparable to results shown in a study done by Gaur, S N; Dhingra, V K et al out of 2118 tuberculosis patients treated between 1999-2001, a total of 238 (11.4%) patients were over 50 years of age and of these 45(2.2%) were over 65 years of age. A total of 78.6% of the 283 TB patients of all the categories included in the study had a successful outcome (cure/ completion) (21)

The overall treatment failure rates were 8% and Treatment failure rates observed in the 50-65 years of age group were 7.14% and 10% in the>65 years of age group i.e. 5 cases out of 70 in the 50-65 years of age group and 3 cases out of 30 in >65 years age group($p>0.656$; nonsignificant) (Table 2). Nyemike Simeon Awunor et al in their study showed a Failure rateof 2.4%($p>0.6$; Nonsignificant)(20)whereas a failure rate of 0.6% for category I and 2.6% for category II has been reported by Srivastava et al and 1.6% by Chadha and Bhaghi in treatment outcome of DOTS.(16) The study done by Y. B. Jibrin et al showed the prevalence of treatment failure was 22.6% (percentage of those still positive after 5 months of treatment).(22). The failure rate of this study was high because this study was conducted in Nigeria where lots of HIV patients were included in the study.

The mortality rate in the present study among the patients 50-65 years ago was 5.71% and 10% in the> 65 years age group. Nyemike Simeon Awunor et al in their study showed a mortality rateof 2.4%($p>0.6$; Nonsignificant). The mortality rate inthe study done by Ramya Ananthkrishnan et al was 7.9%.Gaur et al reported a similar result with a mortality rate of 5.2% in the 50-65-year-old age group and 15.6% in the>65 years age group.Arora et al had observed a mortality rate of 6.1% in patients > 60 years of age.(20,21,22) However, Leung et al reported a mortality rate of 16% in patients > 65 years of age group.

Nausea/vomiting as an adverse reaction to the drugs was reported in 7% of cases,followed by itching/skin rash in 5%, jaundice in 3%, vertigo/dizziness in 4%, and joint pains/arthralgia in 2% cases.

NTEP places more stress on the microscopic examination of sputum but has not rejected radiological examination. Awareness amongst patients regarding their radiological examination has increased because of the easy availability and affordability of such facilities and their wide publicity among the masses. The radiological improvement after treatment of TB with DOTS was seen in 83% of cases in this study.

Progressive immune dysregulation is known in the elderly as there is a marked reduction of CD-8 T cells.Weaning of cell-mediated immunity and age-related pathophysiological respiratory changes predispose to reactivation or re-infection of tuberculosis.A high index of suspicion with appropriate timely investigations may lead to early diagnosis and treatment thereby decreasing the morbidity and mortality attributed to tuberculosis in the elderly.

CONCLUSION

Thus it can be concluded from the present study that because of aging, comorbid states(COPD, Hypertension, diabetes mellitus, etc.),ignorance, misperception of symptoms, poor attention by

DOI: 10.69605/ijlbpr_13.8.2024.116

caregivers, and atypical manifestation of disease, the diagnosis of tuberculosis is difficultand delayed in elderly patients, resulting in advanced disease at time of diagnosis, decreased treatment outcome and higher mortality. Increased awareness of disease recognition and better medical and social support are therefore needed in addressing the problem of tuberculosis in older people

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