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Clinicoradiological Profile of Newly Diagnosed Smear Positive Pulmonary Tuberculosis Among Adults and Elderly Patients

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ABSTRACT

The present study was a prospective study which of those among 50 subjects with smear positive for tuberculosis. The mean age of the participant was 50.62 ± 16.57 with the minimum age as 15 years and maximum age as 75 years in the study population (95% CI 45.91 to 55.33). This study focuses on to compare the clinico-radiological profile of newly diagnosed smear positive pulmonary tuberculosis among adults (18-50years) and elderly (more than 50 years) Patients.

Key words: Tuberculosis, Clinical characteristics, Radiological, Epidemiological, Study population

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INTRODUCTION

Tuberculosis (TB) remains one of the world's most lethal infectious diseases. It is a cause for concern as India stands first in terms of absolute number of cases. Pulmonary tuberculosis presents varyingly amongst adults and the elderly and need to be evaluated differently. Clinical features of TB in older adults may be atypical and confused with age-related diseases. Hence the present study sought to compare the clinical and radiological profile of newly diagnosed smear positive pulmonary tuberculosis in elderly patients with that of adults. Tuberculosis is a major cause of morbidity and mortality and remains an infectious disease of global public health importance. Despite extensive tuberculosis-control efforts on the part of the World Health Organization and local health departments, the tuberculosis epidemic continues to ravage the developing world, affecting all susceptible individuals.

Developed countries have observed a steady decline in tuberculosis cases because of the overall implementation of more-efficient infection control practices, directly observed therapy (DOT), and immense efforts to suppress the HIV/AIDS epidemic etc. But Tuberculosis still is responsible for significant proportion of mortality in developing and underdeveloped nations. The Tuberculosis infection is further compounded by co - infection with HIV, strong association with Diabetes mellitus etc. [1]. With longer life expectancy and declining fertility rate, the global pace of population ageing is getting faster in the new century [2].

It was estimated that the world's population older than 60 years will be more than triple from 600 million in 2000 to 2 billion in 2050, gradually contributed by developing world [3]. The impacts of population ageing on TB epidemiology are complicated and may vary among countries and within countries [3]. Previous studies showed higher TB incidence and mortality in vulnerable elderly in developed world with low or intermediate TB burden [4]. In recent research, the same challenge had increasingly been observed in developing countries with high TB burden, such as China and India [5]. In 2014, the TB notification rates in patients older than 65 years were higher than any other 10 -years-interval groups in 13 developed

and 51 developing countries/regions [6]. TB is rapidly becoming a public health challenge in the elderly worldwide. Considering this changing demographic structure of the population, especially in developing nations like India and China, prevention and control of tuberculosis among elderly population also presents major a clinical and epidemiological challenge [7]. Clinical characteristics of tuberculosis in older adults can be unusual and may be confused with age-related illnesses. Acute or chronic diseases, malnutrition, and the biological changes associated with aging can disrupt protective barriers, impair microbial clearance mechanisms, and contribute to the expected age-related diminution in cellular immune responses to microbes such as Mycobacterium tuberculosis. The diagnosis of tuberculosis can be difficult, and this treatable infection is sometimes documented only on post-mortem examination. In addition, therapy for tuberculosis in elderly individuals is challenging because of the increased incidence of adverse drug reactions [8]. From India, not much data on the problem of tuberculosis in the elderly are available. With changing demography of the population, and increase in the number of elderlies, more and more older individuals are being diagnosed as suffering from tuberculosis. However, the problem of geriatric tuberculosis has not received the attention it deserves.

It is evident from the paucity of literature on this common problem affecting the elderly. Hence there is a strong need for more studies on the profile and manifestations of tuberculosis in elderly [9-27]. The present study is an effort to fill this knowledge gap by comparing the clinical and radiological profile of newly diagnosed smear positive pulmonary tuberculosis in elderly patients with that of adults. The study findings may aid in the clinicians at different levels to enhance their understanding of differences in presentation of tuberculosis in elderly and in turn minimize the chances of missed diagnosis.

MATERIALS AND METHODS

Study design: The present study was a prospective observational study.

Study setting: The study was conducted in the department of Respiratory medicine, Sree Balaji medical College and Hospital.

Study population: The study population included patients presenting with symptoms suggestive of tuberculosis and were diagnosed with smear positive pulmonary tuberculosis.

Inclusion criteria

Subjects diagnosed as new smear positive pulmonary tuberculosis.

Subjects in age group 18-70 years.

Exclusion criteria

Extra pulmonary tuberculosis.

Sero-positive (HIV/AIDS).

Chronic liver/renal failure.

Chronic steroid/immunosuppressive therapy.

Diagnosed Connective tissue disorders.

Malignancy.

Pregnancy.

Study period: The data collection for the study was done between January 2017 to June 2018.

Sample size: The sample size was a total of 50 subjects, satisfying the inclusion and exclusion criteria.

Sampling method: All the eligible subjects were recruited into the study by convenient sampling.

Methods of collection of data: All the relevant data was documented in a structured study proforma.

Study procedure

After obtaining the informed written consent, all the study participants were evaluated by thorough clinical history, physical examination, and relevant investigations. For all the patient's anthropometric data was obtained on weight, height and based on them BMI was calculated. Chest X-ray PA view was obtained in full inspiration for all the study subjects. From all the patients, spot sputum sample was collected in specified containers, as per the standard protocol. They were handed over a container and asked to provide early morning sputum sample, the subsequent day. Both the sputum samples were evaluated for Acid fast bacilli (AFB) by Zeihl-Neelsen (ZN) staining method.

Ethical considerations

Ethical clearance was obtained from ethical committee of Sree Balaji medical College and

Hospital. Written and informed consent was obtained from all the patients and their attendants before the start of the study. All participants were given the option of quitting from study if so desired by them. No element of compulsion was exerted.

Statistical analysis

Descriptive analysis was carried out by mean and standard deviation for quantitative variables, frequency and proportion for categorical variables. Data was also represented using appropriate diagrams like bar diagram, pie diagram and box plots. The association between explanatory variables and categorical outcomes was assessed by cross tabulation and comparison of percentages. Odds ratio along with 95% CI is presented. Chi square test was used to test statistical significance.

Univariate Binary logistic regression analysis was performed to test the association between the explanatory variables and outcome variables. Unadjusted Odds ratio along with 95% CI is presented. Variables with statistical significance in univariate analysis were used to compute multivariate regression analysis.

RESULTS

A total of 50 subjects were included in the final analysis. The mean age of the participant was 50.62 ± 16.57 years. Minimum age was 15 years and maximum age was 75 years in the study population (95% CI 45.91 to 55.33). (Table 1). Among the study population 40 (80.00%) patients were males and remaining 10 (20.00%) patients were females. Descriptive analysis of gender in study population (n=50) (Table 1 and Table 2).

Among the study population 23 (46%) patients were adults and remaining 27 (54%) patients were elderly (Table 3 and Figure 1).

Among the study population 15 (65.20%) patients were male adults, 8 (34.80%) patients were female adults. Among the study population 25 (92.60%) patients were male elderly and 2 (7.40%) patients were female elderly (Table 4).

Among the study population 14 (28%) patients had BMI <18.5, 32 (64%) patients had BMI between 18.5 to 24.9 and remaining 4 (8%) patients had 25 to 29.9. (Table 5 and Figure 2). Among the study population 37(74%) patients were residing in rural area and remaining 13(26%) patients were residing in urban area. (Table 6 and Figure 3).

Table 1: Descriptive analysis of age in study population (n=50).

Parameter	Mean ± SD	Median	Min	Max	95% C.I	
					Lower	Upper
Age in years	50.62 ± 16.57	50	15	75	45.91	55.33

Table 2: Sex ratio.

Gender	Frequency	Percentages
Male	40	80.00%
Female	10	20.00%

Table 3: Distribution of adults/elderly in the study population (N=50).

Adults/Elderly	Frequency	Percentages
Adults	23	46.00%
Elderly	27	54.00%

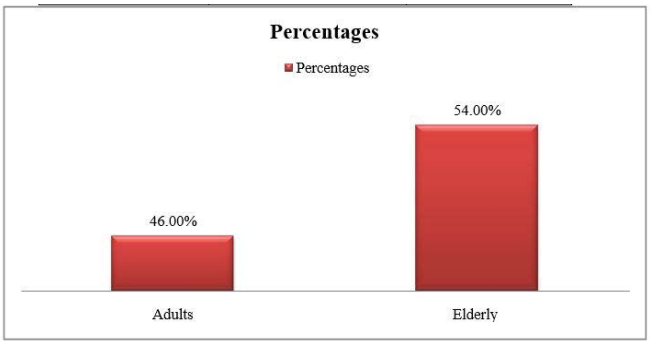

Figure 1: Distribution of study population based on age (N=50).

Table 4: Descriptive analysis of adults and elderly in the study population based on gender (N=50).

Parameter	Frequency	Percent
	Adults (n=23)	
Male	15	65.20%
Female	8	34.80%
	Elderly (n=27)	
Male	25	92.60%
`Female	2	7.40%

Table 5: Descriptive analysis of BMI in the study population (N=50).

BMI	Frequency	Percent
Under weight (<18.5)	14	28.00%
Normal weight (18.5 - 24.9)	32	64.00%
Overweight (25-29.9)	4	8.00%

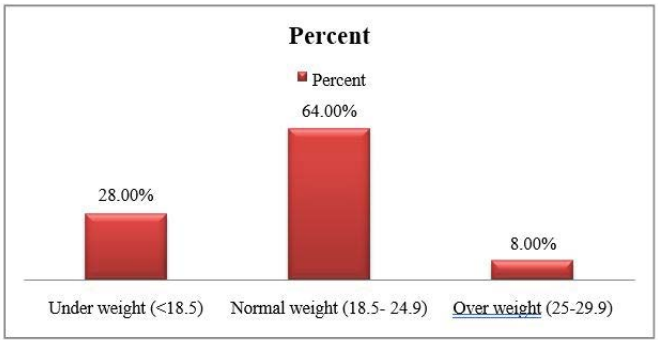

Figure 2: Distribution of study population based on BMI (N=50).

Table 6: Descriptive analysis of place of residence in the study population (N=50).

Place of residence	Frequency	Percent
Rural	37	74.00%
Urban	13	26.00%

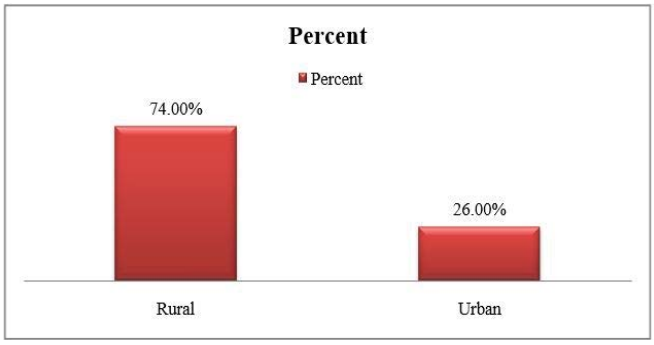

Figure 3: Distribution of study population based on place of residence (N=50).

DISCUSSION

Pulmonary tuberculosis presents varyingly amongst adults and the elderly and need to be evaluated differently [21]. Hence the present study sought to compare the clinical and radiological profile of newly diagnosed smear positive pulmonary tuberculosis in elderly patients with that of adults. The present study was a prospective observational study which was conducted among 50 subjects with smear positive for tuberculosis in the Department of Respiratory medicine, Sree Balaji medical College and Hospital. The mean age of the participant was 50.62 ± 16.57 with the minimum age as 15 years and maximum age as 75 years in the study population (95% CI 45.91 to 55.33). Majority of participants were males i.e., 40 (80.00%) compared to remaining 10(20.00%) females. This higher incidence of male proportion (76.2%vs 23.2%), Patra et al. [12] (63.2% vs 36.8%), Kwon, et al. [13] (51% vs 49%), Leung,

et al. [15] (77.2% vs 22.8%), Velayutham, et al. [17] (84% vs. 71%) and Rawat, (58% vs 42%) [16].

This confirm the world health organisation finding that tuberculosis was most commonly found in males compared to females. One possible explanation for this male predominance may be that in most countries young men usually have more social and labour activities than women, thus favouring the transmission of the disease [16]. Among the study population 23(46%) patients were adults and remaining 27(54%) patients were elderly. This finding was also similar to that reported by WHO [11], Ananthakrishnan et al [5], Velayutham et al. [17] and Rawat et al [21]. Majority of male adults 6(40%) patients belonged to upper lower economic status, 4(50%) were in lower middle status. Majority of female adults 4(50%) were in upper middle status. Majority of male elderly patients 9(36%) were in lower status and 7(28%) patients were in upper lower economic status. There are no previous reports on the SES of study population based on gender. Hence comparison could not be made. Among the study population majority were 20(37.76%) smokers followed by (30.05%) alcoholics, 8(15.09%) ex-smokers, 4(7.67%) ex-alcoholics, 3(5.66%) nonsmokers and 2(3.77%) nonalcoholic.

When the study population were assessed based on age it was found that more numbers of smokers were male adults 8(44.44%) compared to elderly 12(36.26%) whereas majority of alcoholics were elderly 9(25%) compared to adults 7(38.88%). But this was in contrast to that reported by Leung et al [15] and Velayutham et al [17]. This might be due to the fact that the former study was conducted in China 20 were the highest number of young smokers resides compared to the present study which was conducted in India. Among the study population majority of the participants presented with expectoration 43(86%) and cough 41(82%) followed by weight loss 31(62%), anorexia 27(54%), fever 26(52%), dyspnoea 18(36%) and the least was found with chest pain 9(18%), hemoptysis8(16 %) and other symptoms 1(2%). Chest pain [9(100% vs 0)], cough [22(81.5%) vs 19 (82.6%)], expectoration [23(85.2%) vs 20 (87%)], weight loss [18(66.7%) vs 13 (56.5%)], dyspnoea [15(555.6%) vs 3 (13%)] were more common in elderly compared to the adults in the present study. This was like that reported by Kwon et al. [13], Leung et al [15], Lee et al. [7], Nelliyanil et al [14]. The higher incidence of dyspnoea among older patients, can be explained mainly by the expected decrease in pulmonary function with aging [11]. Whereas hemoptysis 5(21.7%) vs 3(11.1%)] and fever [14(60.9%) vs 12(44.4%)] was more common in young adults compared to elderly and this was in line to that reported by Rawat et al [16] (29.5% vs. 6%), Kwon et al [13] (12%19%) Leung et al. [15]. The higher prevalence of hemoptysis in definite cases of younger TB patients in our study, similar to previous studies, could have been related to the higher frequency of cavities in this population [13]. The higher rate of fever incidece in young adults compared to elderly have a decreased pyrogenic response when aging. Elderly patients showed higher frequencies of associated comorbidities like hypertension (22.2% vs 4.3%) and diabetes mellitus (7.4% vs 4.3%) compared to young adults which was like that reported by Kwon et al. [13], Rawat et al [16], Van Den Barnd et al. [9]. A meta-analysis had reported that cardiovascular disorders, COPD, and diabetes were more prevalent in older TB patients compared to young adults. This is not surprising since comorbidities are mostly found in elderly. Some of the observed differences between younger and older patients may be related to a decrease in the immunologic status associated with aging. It is well known that older patients have an impaired T-lymphocyte function, including the proliferative response, which can account for the lower number of leukocytes [15].

CONCLUSION

In conclusion, this study shows that elderly pulmonary tuberculosis patients are more likely to present with anorexia, weight loss, cough, dyspnoea, chest pain. Moreover, the present study reports a higher frequency of comorbidities in elderly TB patients. Whereas radiological findings are more commonly found in young adults compared to elderly. Older subjects represent a population at a special high risk for developing the disease. Hence this study emphasis that elderly are at high risk for developing the disease along with comorbidities than adults. Among the study population 40 (80.00%) patients were males and remaining

10(20.00%) patients were females. Among the smokers 8(44.44%) patients were male adults, 12(36.26%) patients were male elderly, among the nonsmokers only 1(5.6%) was male elderly, among the Ex-smokers 1(5.56%) was male adults, 7(20%) were male elderly. Chest pain [9(100% vs 0)], cough [22(81.5%) vs 19 (82.6%)], expectoration [23(85.2%) vs 20 (87%)], weight loss [18(66.7%) vs13 (56.5%)], dyspnea [15(555.6%) vs 3 (13%)] were more common among elderly compared to adults. Majority of male adults 13(86.7%) patients had expectoration, 12(80%) had cough, 10(66.7%) had fever. Majority of female adults 7(87.5%) patients had expectoration, 7(87.5%) had cough. Right upper lobar involvement was more common among elderly 17(63%) compared to adults11(47 .8%). Right lower lobe involvement [7(25.9%) vs 3(13%)] and left middle lobar involvement [3(13%) vs 8(29.6%)] was high among elderly compared to adults. Right middle lobe [13(56.5%) vs 9(33.3%)] and left upper lobe [10(43.5%) vs 7(25.9%)] involvement was higher among adults compared to elderly. Majority of male adults 7(46.7%) patients had Consolidation; 7(46.7%) patients had Cavitation. Majority of female adults 4(50%) patients had cavitation. Majority of male elderly 10(40%) had cavitation and among female elderly only 1(50%) had Consolidation.

FUNDING

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ETHICAL APPROVAL

The study was approved by the Institutional Ethics Committee.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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