

## Original Research Article

# Clinico-radiological variability of pulmonary tuberculosis in young patients as compared to elder patients prior to RNTCP and after 18 years RNTCP

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### ABSTRACT

**Background:** Tuberculosis, a chronic disease causing high morbidity and mortality with multiple host related and socio-demographic risk factors. Incidence is 3-4 times among in diabetics. HIV is considered to be a most powerful risk factor other being malnutrition, Tubercular contacts, smoking habits and alcoholism. Many ecological and societal threats increase a vulnerability to infection and succession of the disease. Objective was to study and compare various clinico-radiological presentations and clinical risk factors for pulmonary tuberculosis in the young (<50yrs) and elderly (>50yrs) patients.

**Methods:** Total 300 pulmonary tuberculosis patients each admitted in hospital during 1999 (group 'A') and 2016 (group 'B') respectively were included in our study. Socio-demographic risk factors and presence of any existing co morbidities and clinical as well radiological presentation data were evaluated.

**Results:** Majority patients in both group 'A' and 'B' were males (67% and 61.3%), younger (71.3% and 63.3%) patients. Elder patients had more smokers in both groups (48.8% and 33.6%). COPD trends seems to be receding in group 'B' as compared to group 'A' in younger (6.3% vs. 8.9%) as well elder (13.6% vs. 29.1%) but on the contrary lifestyle disease trends like DM increased in group 'B' than group 'A' patients more in elder subgroup (30% vs. 9.3%). HIV infected was more in younger 2.1 % (elder 0.9%) group 'B' patients. Haemoptysis (17.8% and 18.6% vs. 13.7% and 9.1%) and cough (~87% vs. ~85%) were almost similar but fever (~90% vs. ~65%) was seen significantly higher in the young patients. Radiologically bilateral upper lobe cavitations (15%-30%) was a higher in group A patients as compared to negligible less than ~3% cavitations in group B, on the contrary infiltrations (15%-32%) was more in group B.

**Conclusions:** Young adults are more likely to have fever while haemoptysis cough and advanced lung field involvement is more common in elderly. Elderly patients had a higher number of co-morbidities like COPD and DM. The present study reveals that various demographic, socioeconomic and clinical risk factors have a potential role in causation/augmentation of pulmonary tuberculosis hence life style modification, prevention and timely management of these risk factors could be helpful to reduce the burden of disease.

**Keywords:** Co- morbidities, Elderly patients, Pulmonary tuberculosis, Risk factors, Risk factors

### INTRODUCTION

Tuberculosis (TB) is a chronic pulmonary disease with high morbidity and mortality since Ancient times.

Despite the global decline of tuberculosis (TB), the annual risk of TB infection in children from developing countries remains high.<sup>1</sup>

India, second-most populous country, accounts 1/4<sup>th</sup> of TB incidence globally annually. WHO Global TB Report, 2015, out of the estimated global annual incidence of 9.6 million TB cases, 2.2 million occurred in India. In India mortality due to tuberculosis was 17 per lakh in 2012 (2.2 lakhs annually).<sup>2</sup>

National Tuberculosis Control Program of India was started in 1962 with more emphasis on x-ray instead of bacteriological evidence. In absence of definite guidelines in the program, attained success was incomplete. On WHO red alert a 'Revised National Tuberculosis Control Program' (RNTCP) was implemented in India in 1995 with a Directly observed therapy short course strategy (DOTS) recommendations.<sup>3</sup> Improvements in the cure rate and downward trends in default rate were reported but to many the overall impact always has been unsatisfactory as expected.

Other than SPPT, smear-negative pulmonary TB (SNPT) represents 30-60% of all pulmonary TB cases with mortality up to 25%. Also 10-20% of TB transmission is attributable to SNPT cases. Cough, dyspnoea, and haemoptysis were less frequent in SNPT patients in comparison with SPPT patients.<sup>4</sup>

The percentage of smear-positive re-treatment cases is high. The causes of re-treatment include disease relapse after successful treatment completion, treatment failure, and default in treatment.<sup>5</sup> Hence, patients declared as 'successful treatment completion' should be encouraged to report if chest symptoms recur.<sup>6</sup>

The existing adult diabetes (DM) prevalence of 6.9% expected to multiply two fold by 2040. Thus, by facilitating transmission DM might hamper the elimination efforts of tuberculosis. DM Patients tend to be older (49.8 vs. 40.6 years) than non DM Patients.<sup>7</sup>

Many social as well environmental risk factors including proximity of contact, public assembly, indoor contamination and use of bio fuels in rural areas, socio-economic status, housing conditions, smoking habits, alcoholism, malnutrition, living style, customs, and education might be linked to increased infection susceptibility and disease progression.<sup>8</sup>

Granulomas are signs of specific inflammation of the lungs with pulmonary manifestations. Further radiological modalities are usually not needed in the routine work-up of Granulomatous diseases of the chest.<sup>9</sup>

Large upper lobe opacification, cavitations, unilateral pleural effusion and adenopathy were significantly associated with PTB.<sup>10</sup> HIV individuals with PTB may

have a proportionally higher infiltrates and a lower cavitations.<sup>11</sup>

India is considered as "an ageing nation" with 7.7% of its population being more than 60 years old. Pulmonary tuberculosis may presents differently amongst adults and the elderly hence need to be evaluated differently.<sup>12</sup> Non-recognition may lead to the higher morbidity and mortality in the elderly population.<sup>13</sup> Geriatric population is known to have atypical clinical, microbiological presentation as well chest radiographic finding.<sup>14</sup>

After more than 15 years RNTCP-DOTS implementation very few studies measured DOTS regimens results in lasting cure and changing Clinico-radiological pattern for patient treated under programmatic conditions. Hence this study was undertaken to study the Clinico-radiological variability of pulmonary tuberculosis in elderly as compared to young patients.

Aim of research work was to study the frequency of the initial presenting symptoms also, to determine the percentage of radiologically positive patients in the sample studied and to compare the clinico-radiological pattern of pulmonary tuberculosis in the sample patients studied at two different time-period points taken 20 years apart in younger patients (<50 years age) and in elderly patients (>50 years age).

## METHODS

The study was conducted at the Department of Tuberculosis and Chest Diseases, Government Medical College, Patiala on inpatients of tuberculosis admitted at two time points i.e. during year 1999 A.D. and 2016 A.D. It was an observational record based study of the 300 patients each admitted during above two time points. Patient's indoor records along with radiological findings (x-rays) were compared along with various other aspects and comparison was made to see the difference in the trends of patients at these two time points.

### Inclusion criteria

Subjects admitted and diagnosed as pulmonary Tuberculosis with decision to initiate anti tuberculosis treatment.

### Exclusion criteria

- Malignancy
- Pregnancy
- Other Chest diseases with no evidence of Pulmonary Tuberculosis were excluded.

Informed written consent was not required from subjects before enrolment as it was record based observational study.

The Diagnosis of tuberculosis was based on the detailed history, clinical examination, sputum microscopy for acid fast bacilli and chest radiography. For the purpose of comparison these included patients those who were admitted with this institute were grouped in group ‘A’ (1999) and group ‘B’ (2016). These included subjects were further divided into two sub groups-‘Younger’ (aged 0-50yrs) and ‘Elderly’ (aged >50yrs). All chest x-rays were reviewed for presence or absence of cavities, infiltrations, zones involved and extent of disease.

Records were also screened for DM, HIV, smoking, and alcohol habits. Sputum smear for AFB status as well previous history of ATT and any history of tuberculosis contact source in the family was also noted. The data in the sample patients studied was tabulated in excel sheet and it was statistically analysed.

**RESULTS**

Data analysis was done. The patients data taken was grouped into two group i.e. Group ‘A’ were those tubercular patients who were admitted in this hospital during 1999 a period prior to the roll out of RNTCP in Punjab region whereas Group ‘B’ were those patients

who were admitted and enrolled under RNTCP during period 2016 in this hospital. In both group equal no. of patients i.e. 300 patients each was taken for data analysis. Further the data was subdivided into two segments of population on the basis of age i.e. ‘Younger’ and ‘Elders’. ‘Younger’ age group patients were those below 50 years of age whereas Elder age group patients were those above 50 years of age.

**Socio-demographic factors**

Male patients were predominant in both the groups’ i.e. 201/300 (67%) males as compared to 99/300 (31%) females in group ‘A’ (1999) patients and 184/300 (61.3%) males as compared to 116/300 (38.7%) females in group ‘B’ (2016) patients.

Both Groups had more number of Younger patients (< 50 yrs of age) i.e. 214/300 (71.3%) in group ‘A’ (1999) and 190/300 (63.3%) in group ‘B’ (2016). But there was visible shift of data seen toward elder patients (>50 yrs of age) in group ‘B’ (2016) i.e. 110/300 (36.7%) as compared to 86/300 (28.7%) in the same age group patients in group ‘A’ (1999) patients (Table 1 and 2).

**Table 1: Age wise/sex wise incidence 1999.**

Sex Incidence	<50 years n=214				>50 yrs n=86					
	≤19	%	20-34	%	35-49	%	50-64	%	≥65	%
Male (n=201)	16	8%	68	33.8%	54	26.9%	38	18.9%	25	12.4%
	138 (64.5%)				68.7%				63 / (73.3%)	
Female (n=99)	14	14.1%	37	37.4%	25	25.3%	17	17.2%	6	6.1%
	76 (35.5%)				76.8%				23 (26.7%)	
<b>Total (n=300)</b>	30	10%	105	35%	79	26.3%	55	18.3%	31	10.3%

**Table 2: Age wise/sex wise incidence 2016.**

Sex Incidence	<50 years n=190				>50 yrs n=110					
	≤19	%	20-34	%	35-49	%	50-64	%	≥65	%
Male (n=184)	14	7.6%	48	26.1%	49	26.6%	51	27.7%	22	12%
	111 (58.4%)				60.3%				73 (66.4%)	
Female (n=116)	19	16.4%	37	31.9%	23	19.8%	22	19%	15	13%
	79 (41.6%)				68.1%				37 (33.6%)	
<b>Total (n=300)</b>	33	11%	85	28.3%	72	24%	73	24.3%	37	12.3%

**Associated risk factors/habits**

**Smoking:** The prevalence of smoking was more among group ‘A’ patients 27.6% among younger (<50yrs) as well 48.8% of elderly (>50 yrs) as compared to group ‘B’ patients showing 16.3% in younger and 33.6% elderly aged patients respectively.

It was also found that out of tubercular patients in group ‘A’ younger smoker patients 42/59 (71.2%) were sputum

positive but rate was low 24/42 (52.1%) in elder group ‘A’ smokers. Similarly, in group ‘B’ patients also sputum positivity was 24/31 (77.4%) in younger and 20/32 (62.5 %) in elder smokers.

**Alcohol:** Alcohol intake habit the trend was found to be almost similar in elder patients i.e. 31.4% and 30.9% in both group ‘A’ and ‘B’ respectively but on the contrary there was positive declining trend i.e. 24.8% in group ‘A’ younger patients as compared to 20% in group ‘B’

younger patients. Like smokers alcoholics who were found to be pulmonary tuberculosis sputum positivity was ~70% in younger patients in both group ‘A’ and ‘B’ but elder alcoholics rate was more in group ‘B’ (61.8% vs. 44.4%) patients.

**Contact:** Number of group ‘A’ patients with a known history of contact with tubercular patient were higher as compared to group ‘B’ (15% and 6.8%) in younger aged patients but no such difference was noticed in elderly aged patients (2.3% and 3.6%) in either of group. Sputum positivity among group ‘A’ contact cases was ~ 53% and 50% whereas sputum positivity rates were higher among

group ‘B’ contacts ~ 61.5% and 75% in younger and elder patients respectively.

**Past history of ATT:** History of taken an ATT in past was more evident in group ‘B’ patients in both younger aged patients i.e. 34.2% vs. 25.2% as well in elderly patients i.e. 39.1% vs. 16.3%.

Patients with history of taken ATT in the past were found to have more sputum positivity in both the groups of patients in both segments of patients younger (77.8% and 70.8%) or elder (57.1% and 62.8%) patients (Table 3 and 4).

**Table 3: Relevant history in patients with tuberculosis 1999.**

Patients characteristics	<50 years (n=214)		Sputum positivity		>50 yrs (n=86)		Sputum positivity	
	No.	%	No.	%	No.	%	No.	%
Smoking n=101	59	27.6%	42	71.2%	42	48.8%	24	52.1%
Alcohol Intake n=80	53	24.8%	37	69.8%	27	31.4%	12	44.4%
Contact with TB Patients n=34	32	15%	17	53.1%	2	2.3%	1	50%
Previous ATT n=68	54	25.2%	42	77.8%	14	16.3%	8	57.1%

**Table 4: Relevant history in patients with tuberculosis 2016.**

Patients characteristics	<50 years (n=190)		Sputum positivity		>50 yrs (n=110)		Sputum positivity	
	No.	%	No.	%	No.	%	No.	%
Smoking n=63	31	16.3%	24	77.4%	32	33.6%	20	62.5%
Alcohol intake n=72	38	20%	27	71.1%	34	30.9%	21	61.8%
Contact with TB patients n=17	13	6.8%	8	61.5%	4	3.6%	3	75%
Previous ATT n=108	65	34.2%	46	70.8%	43	39.1%	27	62.8%

**Table 5: Incidence of associated medical disease 1999 and 2016.**

Patients characteristics	1999 Group A		2016 Group B		1999 Group A		2016 Group B	
	<50 years n=214		<50 years n=190		>50 yrs n=86		>50 yrs n=110	
	No.	%	No.	%	No.	%	No.	%
COPD	19	8.9%	12	6.3%	25	29.1%	15	13.6%
DM	11	5.2%	12	6.3%	8	9.3%	33	30%
GIT					1	1.2%		
CNS	2	1%	4	2.1%				
CVS			1	0.5%	4	4.7%	8	7.3%
Thyroid			1	0.5%				
AML andCa			1	0.5%			1	0.9%
HIV			4	2.1%			1	0.9%
Bronchitis	7	3.3%			1	1.2%		

**Clinical risk factors**

**COPD:** COPD was major disorder present among the group ‘A’ patients further it seemed to be around triple in the number in elders (29.1%) as compared to younger (8.9%). There was visible decrease in group ‘B’ COPD

seen to be twice more in elder patients (13.6%) than younger (6.3%) patients.

**DM:** DM was prevalent in tune of roughly 2:1 ratio (9.3%: 5.2%) among group ‘A’ elders and younger population respectively. There seem to be a drastic increase of DM in group ‘B’ tuberculosis patients, with

more prevalence among elders (30%) as compared to mere (6.3%) in younger patients roughly in the ratio of 5:1.

**HIV:** HIV seropositivity was found to be more in younger patients i.e. 4(2.1%) as compared to elder i.e. 1(0.9%) in group 'B' patients (Table 5).

**Correlation of sputum smears positivity**

Among younger patients (<50years) the sputum positivity was more among males 88/138 (63.8%) as compared to 31/76 (40.8%) in female in group 'A' patients but the difference narrowed down to <2% on gender basis (56.8% and 55.7%) in Group 'B' younger patients. Trends were similar among elder patients (>50 years) in

both group 'A' (55.6%) and 'B' (56.5%). In group 'A' the sputum positivity was slightly more in younger male patients 63.8% as compared to 58.7% in elder male patients with similar trends in female patients i.e. 40.8% vs. 34.8% in younger and elder female patients respectively. The positivity was almost near equal among either sex (male: 56.85, female: 55.7%) in younger group 'B' patients but among elder patients positivity was on higher side in female patients 59.3% as compared to 56.2% in male elder group 'B' patients.

It further observed that there was visible increase in percentage of female patient's positivity in both the groups A and B in younger (40.8% to 55.7%) female patients and elder (34.8% to 59.5%) female patients (Table 6 and 7).

**Table 6: Sputum examination for acid fast bacilli 1999.**

Patients characteristics	<50 years n=214			>50 yrs n=86		
	Number	Smear +	%age	Number	Smear +	%age
Male	138	88	63.8%	63	37	58.7%
Female	76	31	40.8%	23	8	34.8%
Sputum Positives n=164	214	119	55.6%	86	45	52.3%
Ratio	1.8:1	2.8:1	55.6%	2.7:1	4.6:1	52.3%

**Table 7: Sputum examination for acid fast bacilli 2016.**

Patients characteristics	<50 years n=190			>50 yrs n=110		
	Number	Smear +	%age	Number	Smear +	% Age
Male	111	63	56.8%	73	41	56.2%
Female	79	44	55.7%	37	22	59.5%
Sputum positives n=170	190	107	56.3%	110	63	57.3%
Ratio	1.4:1	1.43:1	56.3%	1.97:1	1.87:1	57.3%

**Table 8: Important clinical features in different age sub groups 1999.**

Age distribution	<50 years (n=214)						>50 yrs (n=86)			
	< 19		20-34		35-49		50-64		>65	
	No.	%	No.	%	No.	%	No.	%	No.	%
Number	30		105		79		55		31	
Male	16	53.3%	68	64.8%	54	68.3%	38	69.1%	25	80.7%
Female	14	46.6%	37	35.2%	25	31.6%	17	30.9%	6	19.4%
Cough n=262	24	80%	91	86.7%	72	91.1%	48	82.3%	27	93.6%
Fever n= 276	30	100%	98	93.3%	73	92.4%	52	94.5%	23	74.2%
Haemoptysis n=54	7	23.3%	16	15.2%	15	19%	11	20%	5	16.1%
Dyspnoea n=105	3	10%	31	29.5%	29	36.7%	24	43.6%	18	58.1%
Weight Loss n=95	11	36.7%	34	32.4%	29	36.7%	15	27.3%	6	19.4%
Anorexia n=187	21	70%	62	59.1%	53	67.1%	32	58.2%	19	61.3%
Malaise n=68	8	26.7%	33	31.4%	15	19%	8	14.6%	4	12.9%
Pain Chest n=57	4	13.3%	23	21.9%	16	20.3%	10	18.2%	4	12.9%
Non Specific n=10	16	53.3%	21	20%	18	22.8%	27	49.1%	18	58.1%
H/O Smoking n=101	1	3.33%	27	25.7%	31	39.2%	20	36.4%	22	71%
H/O Alcohol Intake n=80	1	3.33%	22	21%	30	38%	17	30.9%	10	32.3%
Sputum Smear for AFB n=164	14	46.7%	58	55.2%	47	59.5%	27	49.1%	18	58.1%
PH ATT n=68	3	10%	26	24.8%	25	31.6%	11	20%	3	9.7%
Contact n=34	6	20%	18	17.1%	8	10.1%	1	1.8%	1	3.2%

**Table 9: Important clinical features in different age sub groups 2016.**

Age distribution	<50 years n=190				>50 yrs n=110					
	< 19		20-34		35-49		50-64		>65	
	No.	%	No.	%	No.	%	No.	%	No.	%
Number	33		85		72		73		37	
Male	14	42.4%	48	56.5%	49	68.1%	51	69.9%	22	59.5%
Female	19	57.6%	37	43.5%	23	31.9%	22	30.1%	15	40.5%
Cough n=258	30	90.9%	72	84.7%	62	86.1%	62	84.9%	32	86.5%
Fever n= 199	27	81.8%	60	70.65	42	58.3%	47	64.4%	23	35.1%
Haemoptysis n=36	4	12.1%	13	15.3%	9	12.5%	8	11%	2	5.4%
Dyspnoea n=123	7	21.2%	28	32.9%	35	48.6%	32	43.8%	21	56.8%
Weight Loss n=10	0		2	2.4%	3	4.2%	5	6.9%	0	
Anorexia n=37	4	12.1%	11	12.9%	11	15.3%	7	9.6%	4	10.8%
Malaise n=5	0		2	2.4%	1	1.4%	2	1.4%	0	
Pain Chest n=88	7	21.2%	30	35.3%	24	33.3%	20	27.4%	7	18.9%
Non Specific n=5	0		3	3.5%	0	%	1	1.4%	1	2.7%
H/O Smoking n=63	1	3%	10	11.8%	20	27.8%	26	35.6%	6	16.2%
H/O Alcohol Intake n=72	0		16	18.8%	22	30.6%	27	37%	7	18.9%
Sputum Smear for AFB n=170	18	54.5%	47	55.3%	42	58.3%	43	58.9%	20	54.1%
PH ATT n=108	7	21.2%	27	31.8%	31	43.1%	29	39.7%	14	37.8%
Contact n=17	4	12.1%	6	7.1%	3	4.2%	3	4.1%	1	2.7%

**Table 10: Radiographic findings in patients with pulmonary tuberculosis 1999.**

Radiographic findings number smear +	<50 years n=214				>50 yrs n=86			
	Number	%	Smear +	%	Number	%	Smear +	%
Cavity BL	62	29%	48	77.4%	25	29.1%	18	72%
UL	36	16.8%	20	55.6%	16	18.6%	8	50%
LL	4	1.86%	2	50%	2	2.3%	2	100%
Infiltration UL	52	24.3%	28	53.8%	14	16.3%	4	28.65
BL	38	17.8%	28	73.7%	21	24.4%	16	76.2%
M	10	4.7%	3	30%	2	2.3%	1	50%
L	6	2.8%	3	50%	5	5.8%	2	40%
PLEF UL	16	7.55	3	18.8%	6	7%	0	0%
BL	1	0.5%	1	100%				
H PNTH	2	0.9	0	0				

**Table 11: Incidence of site of tuberculosis 1999.**

Age distribution	<50years n=214				>50 years n=86					
	< 19		20-34		35-49		50-64		>65	
	No.	%	No.	%	No.	%	No.	%	No.	%
Number n=300	30	10%	105	35%	79	26.3%	55	18.3%	31	10%
Cavity BL	8	26.7%	34	32.4%	20	25.3%	19	34.5%	6	19.4%
UL	4	13.3%	17	16.2%	15	19%	11	20%	5	16.1%
LL	1	3.3%	2	1.9%	1	1.3%	0		2	6.5%
Infiltration UL	7	23.3%	21	20%	23	29.1%	9	16.4%	5	16.1%
BL	8	26.7%	21	20%	10	12.7%	13	23.6%	8	25.8%
M	2	6.7%	6	5.7%	2	2.5%	2	3.6%	0	
LL	0		4	3.8%	2	2.5%	4	7.3%	1	3.2%
PLEF UL	2	6.7%	10	%	4	5.1%	2	3.6%	4	12.9%
BL			6	5.7%	1	1.3%				
Hydropneumothorax	1	3.3%			1	1.3%				
Pneumothorax										

**Table 12: Radiographic findings in patients with pulmonary tuberculosis 2016.**

Radiographic findings number smear +	<50 years n=190			>50 yrs n=110		
	Number	%	Smear +	Number	%	Smear +
Cavity UL	6	3.2%	4 (66.7%)	9	8.2%	6 (66.7%)
M	6	3.2%	4 (66.7%)	9	8.2%	6 (66.7%)
BL	5	2.6%	4 (80%)	2	1.8%	2 (100%)
LL	4	2.1%	2 (50%)	0	0	0
Infiltration UL	60	32%	42 (70%)	34	30.9%	24 (80%)
M	44	23.2%	31 (70.5%)	17	15.5%	12 (70.6%)
BL	45	23.7%	32 (71.1)	22	20%	15 (68.2%)
LL	12	6.3%	8 (66.7%)	4	3.6%	3 (75%)
AZ	10	5.3%	6 (60%)	11	10%	9 (81.8%)
PLEF UL	17	8.9%	2 (11.8%)	7	6.4%	0
H PNTH	5	2.6%	3 (60%)	2	1.8%	2 (100%)

**Table 13: Incidence of site of tuberculosis 2016.**

Age distribution	<50years n=190				>50 years n=110					
	< 19		20-34		35-49		50-64		>65	
	No.	%	No.	%	No.	%	No.	%	No.	%
Number	33	17.45	85	44.7%	72	37.95	73	66.4%	37	33.6%
Cavity UL	1	3%	4	4.7%	7	9.7%	6	8.2%	1	2.7%
LL	2	6%	2	2.4 %	0	0	0	0	0	0
BL	0	0	3	3.5%	2	2.8%	2	2.7%	0	0
M	1	3%	3	3.5%	2	2.8%	7	9.6%	2	5.4%
Infiltration UL	10	30%	29	34.1%	21	29.2%	25	34.2%	9	24.3%
M	9	27.3%	18	21.2%	17	23.6%	17	23.3%	9	24.3%
BL	8	2.4%	19	22.3%	18	25%	14	19.2%	8	21.6%
LL	3	9.1%	7	8.2%	2	2.8%	2	2.7%	2	5.4%
AZ	1	3%	5	5.9%	4	5.6%	5	6.8%	6	16.2%
PLEF UL	5	15.2%	5	5.9%	7	9.7%	6	8.2%	1	2.7%
H PNTH	1	3%	2	2.4%	2	2.8%	2	2.74%		

**Clinical symptoms**

In group ‘A’ both younger and elder patients subgroups cough (87.4%, 87.2%) and fever (93.9%, 87.2%) were most common feature. other common feature were anorexia (63.6%, 59.3%), weight loss (34.6%, 24.4%), chest pain (20.1%,15.1%). But dyspnoea was more appreciated by the elder (48.8% vs. 29.4%) population. Non specific complaints were also seemed to be more among elder patients (52.3% vs. 25.7%). Haemoptysis was also found to be almost equal (17.8% vs. 18.6%) in both younger and elder patients.

In group ‘B’ patients cough (86.3%, 85.5%) and fever (67.9%, 63.6%) were most common feature. other common feature were, chest pain (20.1%, 15.1%). Dyspnoea was more appreciated by the elder (48.8% vs. 29.4%) population. Non specific complaints were also seemed to have ceased to negligible (1.6% vs. 1.8%).

Haemoptysis was also found to be (13.7%, 9.1%). Anorexia (11.6%, 10%), Weight loss (2.6%, 4.5%) were reported very low as compared to reported in the group ‘A’ patients (Table 8 and 9).

**Radiological correlation group ‘A’**

**Cavitations:** Cavitations was the most common presentation found radiologically in both the subgroups with bilateral involvement (~29%) of lungs followed by upper lobe (16.8%, 18.6%) cavitations. Highest Bilateral cavitations (34.5%) were found in 50-64-year age group. Lower lobes (1.9%, 2.3%) were least involved in either of subgroup.

**Infiltrations:** In younger upper lobe infiltration of lungs involvement followed by bilateral infiltrative lesions 17.8% in the lungs. But its other way in elder subgroup with bilateral (24.4%) involvement followed by unilateral

16.3% infiltrative lesions. Lower lobe involvement was further less in the both groups with more common in elderly patients of above 50 years.

*Pleural effusion:* Every 7<sup>th</sup> patients had one sided pleural effusion in either of younger (7.5 %) and elder (7%) subgroups. Very small number of patients had bilateral (0.5%) pleural involvement. Hydro-pneumothorax was present among only (0.9%) negligible patients.

*Relation of Sputum for AFB Positivity to radiological findings:* Sputum for AFB positivity was seen maximum in bilateral cavitary disease (77.4 % in younger and 72% in elder patients). It was also seen higher in bilateral Infiltrative disease (73.7% in younger and 76.2% in elder patients) (Table 10 and 11).

### **Radiological correlation group 'B'**

*Infiltrations:* Infiltrations were the most common presentations found radiologically mainly involving the upper lobe (32%, 30.9%) followed by bilateral (23.7%, 20%) and middle (23.2%, 15.5%) zone in younger or elder age group patients.

*Pleural Effusion:* There was good no. of patients with pleural effusion (8.9%, 6.4%) present slightly more among young than elder aged patients.

*Cavitations:* Cavitations were seen comparatively less in all zones (~3%) in these patients. There were small numbers of cases with hydro pneumothorax (2.6%, 1.8%) also.

*Relation of sputum for AFB positivity to radiological findings:* Sputum for AFB positivity was seen maximum in the BL cavitations cases (80 %, 100%). It was followed by the UL and M infiltrations (~70% patients). Cavitations in upper lobe and middle lobe have slightly lower positivity among all patients (~67%). Hydropneumothorax (60%-100%) patients got very high positivity as compared to pneumothorax (~12%) patients. (Table 12 and 13).

## **DISCUSSION**

### **Socio-demographic factors**

Males are more aware than females regarding different aspects of tuberculosis.<sup>15</sup> There is predominance of male patients in our study too Male i.e. 201/300 (67%) and 184/300 (61.3%) as compared to females 99/300 (31%) and 116/300 (38.7%) in both the groups 'A' and 'B' respectively. Males were proportionally slightly more in Group 'A' patients probably because of more male predominance, movement and contact exposure in the society leading to more disease but over the period the scenario is on the change with good number of females too seen in the work force leading to equal exposure to tuberculosis infection. Morris et al reported 78% of their

patients to be males.<sup>16</sup> Bhatia et al, reported 76% male and 24% female patients in their study.<sup>17</sup> Meta analysis of 12 studies done by Carlos Perez Guzman also showed male preponderance.<sup>18</sup>

In our study, both Groups had younger patients (aged < 50 yrs) i.e. 214/300 (71.3%) in group A (during 1999) and 190/300 (63.3%) in group B (during 2016). Possibly may be that younger usually have more social and labour activities favouring the transmission of the disease. There is little difference between boys and girls up to puberty.<sup>19</sup>

There are two peaks in incidence observed i.e. 1-4 years of age and the second in adolescents and young adults.<sup>20</sup> An infected child may develop Miliary TB or tuberculous meningitis or one of the more chronic disseminated types of TB, particularly lymph node, bones or joint disease, or pleural involvement.<sup>21</sup> Each infectious source approximately infects 10-15 new cases annually.<sup>22</sup> The male rate continued fairly high at all ages, but the female rate tended to drop rapidly after the child bearing years. In India pulmonary TB seems to increase with age in both sexes. In women the overall prevalence is lower with a maximum at the age of 40-50 and then it falls while in men it goes on rising at least to age 60.<sup>23</sup>

### **Associated risk factors/habits**

In our study, smoking was seen more among group 'A' patients i.e. younger (<50yrs) 27.6% as well elderly (>50 yrs) 48.8%. Sputum positivity was also seen above 70% in younger patients in both groups 'A' and 'B' among smokers.

Both smoking and diabetes can augment the risk and alter the expression and outcomes of tuberculosis (TB). Smoking and diabetes have combined consequence with a risk of pre-treatment positive smear increased to 5-fold in diabetic smokers than non-diabetic non-smokers.<sup>24</sup>

Alcohol intake habit was seemed to be slightly more among group 'A' younger patients i.e. 24.8% against 20% among group 'B' young patients whereas data was almost equal as far elders concern. Alcoholics with pulmonary tuberculosis had ~70% sputum positivity in younger patients in both group 'A' and 'B'.

Study by Gupta S et al, found 73% patients were smokers and 28.9% patients were alcoholics as in our study too.<sup>25</sup> Study by Aashutosh Asati et al, has also shown that TB was found to be significantly associated with male gender, married individuals, smoking, drinking, and illiteracy.<sup>26</sup>

Number of patients with a known history of contact with tubercular patient was higher in group 'A' patients i.e. 15% as compared to 6.8 % in group B in younger aged patients without any much difference among elders. Study by Gupta S et al found history of contact with TB (3.4%).<sup>25</sup>

### **Clinical risk factors**

COPD was major disorder present among the group 'A' patients with elder vs. younger in ratio of 3:1 i.e. 29.1%: 8.9%. There is visible decrease in absolute numbers as well ratio to 2:1 among elder vs. younger i.e. 13.6%: 6.3% in group 'B' COPD patients.

In our study, HIV infected was 2.1% patients. Comparatively lesser than found by Hill et al and Gupta S et al where HIV prevalence was found to be 6.1% and 10.6% in TB patient's respectively.<sup>27,25</sup>

In our study, prevalence of DM was roughly 2:1 ratio (9.3%: 5.2%) among group 'A' elders and younger population respectively. DM seen drastic increased in group 'B' tuberculosis patients, with ratio of 5:1 among elders (30%) vs. younger patients (6.3%). Srivatava AB et al and Raghuraman S et al, also reported the prevalence of diabetes in TB patients as 8.2% and 29% respectively.<sup>28,29</sup> In western studies relative risk of tuberculosis was found to be 2.0-3.6 times more among diabetics.<sup>30</sup>

In our study, comparison between two groups showed that there is a decreased trends of COPD in group 'B' as compared to Group 'A' in both younger (6.3% vs. 8.9%) and elder (13.6% vs. 29.1%) patients. But on the contrary lifestyle disease like DM has shown an increase in group 'B' than group 'A' patients more in elder subgroup (30% vs. 9.3%) also in younger (6.3% vs. 5.2%).

The prevalence of high FBS was found to be higher in newly diagnosed pulmonary TB patients.<sup>31</sup> At least 15% of the DM patients tend to be newly-diagnosed and younger emphasises the importance of early DM diagnosis at TB clinics.<sup>32</sup> Developing countries with an alarming TB endemic and TB-DM association might be the next universal threat. Proper scheduling and group effort are necessary to reduce the dual liability of diabetes and TB.<sup>33</sup> Patients with DM and pulmonary TB had more severe clinical manifestations, delayed sputum conversion, a higher probability of treatment failure, recurrence and relapse.<sup>34</sup>

### **Correlation of sputum smears positivity**

Among younger (<50years) patients the sputum positivity is more among males 88/138 (63.8%) as compared to 40.8% in female in group 'A' patients. Group 'B' the positivity is almost near equal among either sex (male: 56.85, female: 55.7%) in younger patients but among elder patients positivity is on higher side in female patients 59.3% as compared to 56.2% in male elder patients. There is visible increase in percentage of female patient's positivity in both the groups 'A' and 'B' in younger (40.8% to 55.7%) female patients and elder (34.8% to 59.5%) female patients. Comparative High bacillary load in elderly possibly making them more infectious that warrants early diagnosis and management.

Tan et al also reported that the elderly had significantly more severe disease and high bacteriological burden compared with age group 15-45 years.<sup>35</sup>

### **Clinical symptoms**

Similar to our findings Rawat J et al, also compared the clinico-radiological pattern of pulmonary tuberculosis in adults and elderly patients and observed that "haemoptysis (29.5% vs. 6%), fever (95.4% vs. 76%) and night sweats (54.5% vs. 18.0%) were significantly higher in the adults".<sup>36</sup> Anand Patel et al, from Gujarat reported that elderly had less incidence of fever, chest pain, haemoptysis and higher incidence of dyspnoea as compared to adults.<sup>37</sup> Umeki et al found that haemoptysis occurred equally in both groups.<sup>38</sup>

In our study, also in Group 'A' patients cough (87.4%, 87.2%) and fever (93.9%, 87.2%) is most common feature. Group B patients cough (86.3%, 85.5%) and fever (67.9%, 63.6%) are most common feature. In our study, breathlessness, loss of appetite, loss of weight and chest pain was found significantly higher in elderly and haemoptysis was significantly higher in adults. The most common presenting complaint in both the groups was cough with (or) without expectoration.

### **Radiological correlation**

In our study, in group A patients most common presentation radiologically was cavitations in both the subgroups with bilateral involvement (~29%) of lungs followed by upper lobe (16.8%, 18.6%) cavitations. Highest bilateral cavitations were found in 50-64-year age group. Lower lobes (1.9%, 2.3%) were least involved in either of subgroup.

There is infiltration of lungs with more involvement of upper lobe followed by bilateral infiltrative lesions in the lungs. Sputum for AFB positivity was seen maximum in the BL cavitations cases (77.4 % in younger and 72% in elder patients). It was followed by the BL Infiltrations (73.7% and 76.2%patients).

Group B patients there were highest no. lesions was infiltrations mainly involving the upper lobe followed by middle and lower zone in either of younger or elder age group patients.

Sputum for AFB positivity was seen maximum in the BL cavitations cases (80 % in younger and 100% in elder patients). It was followed by the UL and M Infiltrations (~70% patients).

As compared to younger adults elderly has more of advance disease with bilateral involvement and lower zone predominance. In DM it has been suggested that TB tend to occur predominantly in the lower lobes.<sup>39</sup> Hariprasad et al, reported in tuberculous diabetics and older age groups to have more frequent lower lung field

involvement.<sup>40</sup> Jagdish Rawat et al, also described a higher association of lower zone (24.0% against 7.9%) and far progressive lesions (32.0% against 14.7%) among elderly.<sup>36</sup>

## CONCLUSION

This study shows that elderly pulmonary tuberculosis patients are more likely to present with non-specific symptoms and atypical radiographic findings. Moreover, we found a higher frequency of co-morbidities and higher TB related mortality in elderly TB patients. Thus, atypical Clinico-radiological manifestation of tuberculosis in older persons can result in delay in diagnosis and initiation of treatment. This can lead to unfortunately higher rates of morbidity and mortality from this treatable infection in this population. So maintenance of a high index of suspicion for tuberculosis in this vulnerable population is undoubtedly justifiable.

Hence, this study provides useful information about the risk factors for Pulmonary TB that can be used to control the disease, by preventing these potential risk factors in population and timely diagnosing and providing treatment for pulmonary TB. We suggest that in addition to the systematic HIV screening, all new TB patients should also be screened for diabetes.

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