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DIFFERENT CHEST X-RAY PRESENTATIONS OF TUBERCULOSIS IN IMMUNOCOMPETENT PATIENTS AND CORRELATION WITH SPUTUM SEVERITY

Respiratory Medicine

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ABSTRACT

Introduction: Tuberculosis (TB) is a communicable disease and a major cause of ill health as well as one of the leading causes of death worldwide. Our aim is to study different chest x-ray presentations with their bacterial load in immunocompetent patients with pulmonary tuberculosis at TMMC & RC. **Materials And Methods:** We studied 50 microbiologically confirmed immunocompetent pulmonary tuberculosis patients who had no previous history of anti-tubercular therapy. Different chest x-ray presentations and their sputum severity status was studied. **Results:** Consolidation was predominant lesion in both genders affecting 60% male and 53.3% females. As per the zonal distribution of the lesions, predominantly middle zone lesions were observed. Among patients with consolidation, majority (44.4%) patients had low bacillary load and 64.7% patients with cavitatory lesions had medium bacillary load. **Conclusion:** The most common radiological presentation is consolidation predominantly in middle zone. Cavitatory lesion is associated with higher bacterial load as compared to consolidation.

KEYWORDS

Chest x-ray, immunocompetent tuberculosis patients, sputum severity.

INTRODUCTION-

Tuberculosis (TB) is a communicable disease and a major cause of ill health as well as one of the leading causes of death worldwide. In 2022, TB was the world's second leading cause of death from a single infectious agent, after coronavirus disease (COVID-19), and caused almost twice as many deaths as HIV/AIDS. More than 10 million people continue to fall ill with TB every year. An estimated 10.6 million people fell ill with TB in 2021, an increase of 4.5% from 10.1 million in 2020. The TB incidence rate (new cases per 100 000 population per year) rose by 3.6% between 2020 and 2021. Thirty high TB burden countries accounted for 87% of the world's TB cases in 2022 and two-thirds of the global total was in eight countries: India (27%), Indonesia (10%), China (7.1%), the Philippines (7.0%), Pakistan (5.7%), Nigeria (4.5%), Bangladesh (3.6%) and the Democratic Republic of the Congo (3.0%). Ending the TB epidemic by 2030 is among the health targets of the United Nations Sustainable Development Goals (SDGs). Ending TB epidemic by 2025 is among the health targets of India.[1]

Chest radiographs have been used as a primary tool to diagnose and manage pulmonary tuberculosis (PTB) while smear and CBNAAT bacillary load represents abundance of MTB bacilli in respiratory specimen which directly correlates with infectivity of a patient to others around him.[2] Though chest radiography (CXR) provides useful information regarding disease extent and progress, yet there is no agreed-upon and validated system for grading the severity of CXR abnormalities in bacteriologically proven pulmonary TB.[3]

AIM

TO STUDY DIFFERENT CHEST X-RAY PRESENTATIONS AND SPUTUM SEVERITY IN IMMUNOCOMPETENT PATIENTS WITH PULMONARY TUBERCULOSIS AT TMMC&RC.

OBJECTIVE

1. To evaluate different chest x-ray presentations for microbiologically confirmed PTB patients.
2. To correlate bacterial load in respiratory specimens with different radiological presentations.

METHODOLOGY

We studied 50 pulmonary tuberculosis patients with confirmed microbiological status in whom all the inclusion and exclusion criteria were met. We evaluated their chest x ray and lesions were classified into focal opacities of less than 2cm, consolidation, cavitatory lesion, fibrocavitatory lesion, collapsed lung and normal chest x-ray. Bacillary load on smear and CBNAAT was divided into low, medium and high where low included scanty, AFB 1+ and low on CBNAAT; medium included AFB 2+ and medium on CBNAAT and high included AFB 3+ and high on CBNAAT.

Inclusion Criteria

Microbiologically confirmed immunocompetent PTB patients.

Exclusion Criteria

Patients on immunosuppresive therapy.
HIV, diabetic patients.
Patients with history of pulmonary tuberculosis or any other structural lung disease like ILDs/ bronchiectasis.

RESULT

FOCAL OPACITY	12
UPPER ZONE CONSOLIDATION	9
MIDDLE ZONE CONSOLIDATION	11
LOWER ZONE CONSOLIDATION	6
UPPER ZONE CAVITY	4
MIDDLE ZONE CAVITY	11
LOWER ZONE CAVITY	3
FIBROCAVITATORY	4
NORMAL CHEST X RAY	1
COLLAPSED LUNG	1
BILATERAL LUNG CONSOLIDATION	10
BILATERAL LUNG CAVITY	6

	AFB 1+	AFB 2+	AFB 3+	CBNAAT - L	CBNAAT- M	CBNAAT- H
FOCAL OPACITY			1	3	8	
CONSOLIDATION	4		3	8	8	4
U/Z CONSOLIDATION				3	6	

M/Z CONSOLIDATION				6	5	
L/Z CONSOLIDATION			1	3	1	1
U/Z CAVITY					4	
M/Z CAVITY	2	1	1	1	6	
L/Z CAVITY	1				1	1
FIBROCAVITATORY				1	2	1
COLLAPSE				1		
WNL	1					

OBSERVATION

We collected the data of 50 immunocompetent PTB patients who were microbiologically confirmed with no prior history of anti-tubercular therapy. Majority of the patient were from rural areas with 78% ratio, history of chronic smoking was present in 50% patients and 68% were of male gender. Consolidation was predominant lesion in both genders affecting 60% male and 53.3% females. Among these 50 patients, 54% of the patients had consolidation of which 40.7% had it in middle zone, 22.2% had it in lower zone and 33.3% had it in upper zone and 14% had pan lung involvement. 34% patients had cavitatory lesions out of which 23.5% had it in upper zone, 58.8% had it in middle zone and 17.64% had it in lower zone. Fibrocavitatory lesion was seen in 8% of the patients while 24% patients had focal opacities of less than 2cm. Bilateral lung involvement was seen in 24% patients. Only 1 patient presented with normal chest x-ray and only 1 presented with left lower lobe collapse.

As per the zonal distribution of the lesions, predominantly middle zone lesions were observed in 60% patients, while 36% had predominantly upper zone and 28% patients had lower zone predominant lesions and around 14% had diffuse pan-lung distribution.

Among upper zone lesions consolidations were observed in 50%, 33.3% had focal opacities and cavities were observed in 22.2% patients.

Among middle zone lesions 36.6% patients had consolidation and equally 36.6% patients had cavities, and 26.6% patients had focal opacities.

Patients with lower zone distribution had consolidation in 42.8% patients, focal opacities in 35.7% patients and cavities in 21.4% patients.

In patients with bilateral lung involvement, 83.3% (n=10) patients had consolidation and 50% (n=6) patients had cavitatory lesions.

Predominant lesion was consolidation with 85.75% in rural areas and 75% in urban areas.

Consolidation was seen in 58.3% patients who never smoked and in 73.07% patients with smoking history.

Of all the patients with focal opacities, only 8.3% patient had high bacillary load and 66.6% patient had medium bacillary load. Among patients with consolidation 25.92% patient had high bacillary load, 44.4% patient had low bacillary load and 16% patients had medium bacillary load. 64.7% patients with cavitatory lesions had medium bacillary load, 23.5% patients had low bacillary load and 11.7% patients had high bacillary load. Of all the fibrocavitatory patients 50% patient had medium bacillary load and 25% had low and high bacillary load each. Low bacillary load was observed in patients with collapsed lung and normal chest x-ray.

DISCUSSION

In contrast to the study conducted by Murthy et al. at UK, majority of patients in our study had consolidation as predominant radiological lesion instead of cavitatory lesions. We collected data of 50 immunocompetent patients of which majority (54%) patients had consolidation and out of these 40.7% patients had lesions in middle zone .

Predominantly middle zone distribution was observed among these patients with consolidation and cavitation affecting similar number of patients (36.6% each). Among upper zone and lower zone lesions, consolidation was most common finding affecting 50% and 42.8% patients respectively.

Consolidation was even more common among smokers affecting 73.07% patients.

44.4% patients had low bacillary load with consolidation as their radiological presentation and 64.7% patients with cavitatory lesion had medium bacillary load. This finding is consistent with the previous study findings. Similarly to the previously conducted studies, higher bacillary loads were observed among cavitatory lesions while 44.4% patients with consolidation had low bacillary loads.

CONCLUSION

In our study we observed that most common radiological presentation is consolidation predominantly in middle zone. Cavitatory lesion is associated with higher bacterial load as compared to consolidation. Consolidation is even more common lesion among smokers.

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