ORIGINAL RESEARCH

An epidemiological assessment of clinical profile and histopathological spectrum of pulmonary tuberculosis patients

[1]Dr. Rajeev Kumar, [2]Dr. Sawli Mahajan

[1]Assistant Professor, Department of Community Medicine, Narayana Medical College, Nellore, India
[2]Assistant Professor, Department of Pathology, Narayana Medical College, Nellore, India

Corresponding author
Dr. Sawli Mahajan
Assistant Professor, Department of Pathology, Narayana Medical College, Nellore, India

ABSTRACT
Background: Pulmonary tuberculosis (TB) is a chronic infectious disease caused by the bacterium Mycobacterium tuberculosis (M. tuberculosis), characterized by its contagious nature and significant difficulty in management. Hence; the present study was conducted for assessing the clinical profile and histopathological spectrum of pulmonary tuberculosis patients. **Materials & methods:** A cohort of 100 individuals with a confirmed diagnosis of breast cancer was included in the study. Comprehensive demographic and clinical information for each patient was collected. A structured proforma was developed to document all clinical findings. Radiographic evaluations were performed, followed by sputum examinations to validate the diagnosis of pulmonary tuberculosis. Histological slides stained with hematoxylin and eosin from biopsies of all patients were individually analyzed. A thorough histopathological evaluation was conducted for each case. The results were systematically recorded in a Microsoft Excel spreadsheet and subsequently analyzed statistically using SPSS software, with univariate analysis employed to assess the significance levels. **Results:** A total of 100 patients were enrolled. Mean age of the patients was 51.8 years. Fever, Cough, Malaise, Weight loss, Sweats, Anorexia, Hemoptysis and Dyspnea was seen in 100 percent, 100 percent, 92 percent, 56 percent, 66 percent, 81 percent, 46 percent, and 33 percent of the patients respectively. While assessing the histopathological profile, it was seen that Epithelioid cells, Langhan giant cells, Caseous necrosis, Granulomatous inflammation, Fibrosis tissue, Acute inflammatory cells and Chronic inflammatory cellswere seen in 89 percent, 78 percent, 66 percent, 53 percent, 51 percent, 49 and 5 percent of the patients respectively. **Conclusion:** There is an urgent need of preventive educational awareness programs for increasing the awareness among general population about the disease so that early detection and prompt treatment could be started.
Key words: Pulmonary, Tuberculosis

INTRODUCTION
Pulmonary tuberculosis (TB) is a chronic infectious disease caused by the bacterium Mycobacterium tuberculosis (M. tuberculosis), characterized by its contagious nature and significant difficulty in management. Despite the identification of M. tuberculosis over a century ago and the existence of effective therapeutic options, TB remains a persistent global health issue. The obstacles to its eradication are multifaceted, encompassing inadequate global coverage for TB diagnosis and treatment, the emergence of M. tuberculosis strains resistant to both first- and second-line antibiotics, the need for reliable markers or biomarkers for monitoring treatment efficacy, the development of effective vaccines, and the presence of coexisting diseases that impair the host's immune response, contributing to the resurgence of TB.[1-3]Most tuberculosis control programs primarily rely on direct smear examination of sputum; however, when resources allow, culture methods are preferred. Reliable susceptibility testing remains a luxury that is often unattainable for many developing countries, despite its critical importance in re-treatment scenarios. In contrast, rapid culture and susceptibility testing methods are readily accessible in more affluent nations. Additionally, molecular techniques have introduced rapid, sensitive, and specific diagnostic tests for Mycobacterium tuberculosis, including polymerase chain reaction, DNA and RNA probes, and γ interferon assays; nevertheless, these methods tend to be costly and require advanced technical expertise.[4, 5]Hence; the present study was conducted for assessing the clinical profile and histopathological spectrum of pulmonary tuberculosis patients.

MATERIALS & METHODS

This epidemiological investigation aimed to evaluate the clinical characteristics and histopathological diversity among patients diagnosed with pulmonary tuberculosis. A cohort of 100 individuals with a confirmed diagnosis of breast cancer was included in the study. Comprehensive demographic and clinical information for each patient was collected. A structured proforma was developed to document all clinical findings. Radiographic evaluations were performed, followed by sputum examinations to validate the diagnosis of pulmonary tuberculosis. Histological slides stained with hematoxylin and eosin from biopsies of all patients were individually analyzed. A thorough histopathological evaluation was conducted for each case. The results were systematically recorded in a Microsoft Excel spreadsheet and subsequently analyzed statistically using SPSS software, with univariate analysis employed to assess the significance levels.

RESULTS

A total of 100 patients were enrolled. Mean age of the patients was 51.8 years. Fever, Cough, Malaise, Weight loss, Sweats, Anorexia, Hemoptysis and Dyspnea was seen in 100 percent, 100 percent, 92 percent, 56 percent, 66 percent, 81 percent, 46 percent, and 33 percent of the patients respectively. While assessing the histopathological profile, it was seen that Epithelioid cells, Langhan giant cells, Caseous necrosis, Granulomatous inflammation, Fibrosis tissue, Acute inflammatory cells and Chronic inflammatory cellswere seen in 89 percent, 78 percent, 66 percent, 53 percent, 51 percent, 49 and 5 percent of the patients respectively.

Table 1: Demographic and clinical data

Variable		Number	Percentage
Age group (years)	Less than 40	23	23
	40 to 50	29	29
	More than 50	49	49
Residence	Rural	66	66
	Urban	34	34
Clinical profile	Fever	100	100
	Cough	100	100
	Malaise	92	92
	Weight loss	56	56
	Sweats	66	66
	Anorexia	81	81
	Hemoptysis	46	46
	Dyspnea	33	33

Table 2: Histopathological description

Histopathology	Number	Percentage
Epithelioid cells	89	89
Langhan giant cells	78	78
Caseous necrosis	66	66
Granulomatous inflammation	53	53
Fibrosis tissue	51	51
Acute inflammatory cells	49	49
Chronic inflammatory cells	5	5

DISCUSSION

Pulmonary tuberculosis (PTB) is an infectious disease caused by Mycobacterium tuberculosis. This microorganism not only infects the lung but also other organs such as brain, kidneys and lymph nodes.Today, tuberculosis constitutes global public health problem with a greater impact in less industrialized countries. According to the estimates of World Health Organization (WHO), there are around 8.7 million new cases every year out of which 0.5 million are children. The Pan American Health Organization (PAHO) notifies 250,000 cases each year with a yearly toll of around 20,000 deaths. It is estimated that in countries of low endemicity, tuberculosis in pediatric age represents less than 5% of all cases of tuberculosis while in high endemic countries; it could be as high as 20%.[8- 10]

A total of 100 patients were enrolled. Mean age of the patients was 51.8 years. Fever, Cough, Malaise, Weight loss, Sweats, Anorexia, Hemoptysis and Dyspnea was seen in 100 percent, 100 percent, 92 percent, 56 percent, 66 percent, 81 percent, 46 percent, and 33 percent of the patients respectively. While assessing the histopathological profile, it was seen that Epithelioid cells, Langhan giant cells, Caseous necrosis, Granulomatous inflammation, Fibrosis tissue, Acute inflammatory cells and Chronic inflammatory cellswere seen in 89 percent, 78

percent, 66 percent, 53 percent, 51 percent, 49 and 5 percent of the patients respectively. Thoker ZA et al conducted an analysis of the clinical characteristics and quality of life (QoL) among patients experiencing sequelae following pulmonary tuberculosis (PTB). The cohort studied was predominantly younger, with a mean age of 44.27 years, and exhibited body mass indices (BMIs) that were generally on the lower end of the normal range, with a median of 19.6 kg/m². A significant majority of the participants were male (59%) and non-smokers (77%). Clinico-radiological assessments confirmed PTB in 68% of the patients, while only 9% reported non-compliance with antitubercular treatment (ATT). Approximately one-third of the patients underwent multiple ATT regimens, primarily based on clinico-radiological findings. The most prevalent comorbidities identified were systemic hypertension (11%) and diabetes mellitus (9%). The predominant symptom complex included cough, expectoration, and dyspnea, affecting 59% of the cohort (n=102). Notably, 20% of patients experienced at least one episode of massive hemoptysis, and bronchial artery embolization (BAE) was performed in 26% of cases with moderate to massive hemoptysis, achieving a success rate exceeding 90%. One-fifth of the participants required hospitalization due to exacerbated respiratory symptoms, with over half of these cases (59%) necessitating ventilatory support. The health-related QoL was markedly diminished, as indicated by a median St George's Respiratory Questionnaire (SGRQ) total score of 45.53, with the activity domain being the most adversely affected.[11]Singh S et al compared the clinical and laboratory profile of pulmonary TB (PTB) and extra PTB (EPTB) in children and adolescents.In their retrospective observational study, children attending the pediatric TB clinic. A total of 58 children included. Out of which, 33 (56.9%) had PTB, and 25 (43.1%) had EPTB. The EPTB cases included 15 (60%) pleural TB, 9 (36%) lymph node TB, and 1 (4%) TB meningitis patient. Fever, cough, and weight loss were the most common symptoms. Hilar lymphadenopathy was the most common radiological abnormality. Microbiological confirmation was possible in 54.5% of patients with PTB. Cough and microbiological confirmation were more in PTB as compared to EPTB.PTB and EPTB are common in children and adolescents.[12]

CONCLUSION

There is an urgent need of preventive educational awareness programs for increasing the awareness among general population about the disease so that early detection and prompt treatment could be started.

REFERENCES

1. Raviglione MC, Snider DE, Kochi A. Global epidemiology of tuberculosis: morbidity and mortality of a world-wide epidemic. JAMA 1995;273: 220-6.
2. Corbett EL, Watt CJ, Walker N, Maher D, Williams BG, Raviglione MC, et al. The growing burden of tuberculosis: global trends and interactions with the HIV epidemic. Arch Intern Med 2003;163: 1009-12.
3. Schenkel J.M., Masopust D. Tissue-resident memory T cells. Immunity. 2014;41:886–897.
4. Morrison H., McShane H. Local Pulmonary Immunological Biomarkers in Tuberculosis. Front. Immunol. 2021;12:640916.
5. Gonzalez Y., Herrera M.T., Juárez E., Salazar-Lezama M.A., Bobadilla K., Torres M. CD161 Expression Defines a Th1/Th17 Polyfunctional Subset of Resident Memory T Lymphocytes in Bronchoalveolar Cells. PLoS ONE. 2015;10:e0123591.
6. Zeng G., Zhang G., Chen X. Th1 cytokines, true functional signatures for protective immunity against TB? Cell. Mol. Immunol. 2018;15:206–215.
7. Crampin AC, Floyd S, Mwaungulu F, Black G, Ndhlovu R, Mwaiyeghele E, et al. Comparison of two versus three smears in identifying culture-positive tuberculosis patients in a rural African setting with high HIV prevalence. Int J Tuberc Lung Dis 2001;5: 994-9.
8. World Health Organization. Global tuberculosis report 2012.
http://www.who.int/tb/publications/global_report/en/
9. Pan American Health Organization. Epidemiological evaluation of tuberculosis. Tendencies in some countries of the Americas. Bol Epidemiol. 1987;8:1–5.
10. Walls T, Shingadia D. Global epidemiology of paediatric tuberculosis. J Infect. 2004;48:13–22
11. Thoker ZA, Madan K, Mittal S, Tiwari P, Shah TH, Mohan A, Hadda V, Guleria R. Clinical Profile and Quality of Life of Patients With Post-pulmonary Tuberculosis Sequelae Presenting to a Tertiary Care Hospital. Cureus. 2023 Mar 19;15(3):e36354
12. Singh S, Chegondi M, Chacham S, Kumar P, Goyal JP. Comparison of clinical and laboratory profile of pulmonary and extrapulmonary tuberculosis in children: A single-center experience from India. J Clin Transl Res. 2021 Jul 16;7(4):423-427.