

**STUDY OF 200 CASES OF PLEURAL FLUID**Ramakrishna R<sup>1</sup>, Venkata Kalyan Kumar P<sup>2</sup><sup>1</sup>Professor, Department of Pulmonary Medicine, Katuri Medical College, Guntur.<sup>2</sup>Associate Professor, Department of Pulmonary Medicine, Katuri Medical College, Guntur.**ABSTRACT****BACKGROUND**

We have studied 200 patients of pleural fluid presenting to our tertiary care centre. Presence of cases of pleural fluid is a common presentation both in pulmonary and extrapulmonary diseases. We analysed the patients having both exudates and transudates and studied the results.

**MATERIALS AND METHODS**

We selected patients above 20 years of age and classified the patients with pleural fluid as having transudates and exudates. We studied the causes of transudates and exudates. A total of 200 patients are studied in this prospective study. Diagnosis of pleural exudates is made on the basis of Light's criteria, chest x-ray, pleural fluid analysis, CT scan in selected patients, sputum examination, bronchoscopy and bronchial washings. Moribund and non-cooperative patients and HIV positives were excluded from the study.

**RESULTS**

Among the 200 patients, 91% have exudates. 9% have transudates by Light's criteria. Tuberculosis is the commonest cause of effusions (64.83%) followed by malignancy (13.73%) and sympleuronic or parapneumonic effusions (9.89%). Pleural effusions occurred predominantly in males. Prevalence of diabetes Mellitus among cases of tuberculous pleural effusions is 13.56%. Tuberculous effusions are predominantly right-sided.

**CONCLUSION**

Predominant cases of pleural fluid are exudates. Commonest cause of pleural effusion is Tuberculosis followed by malignancy both pulmonary and extrapulmonary and sym. and parapneumonic effusions. Prevalence of Diabetes among Tuberculous pleural effusion cases is more or less same as in general population. Cough, expectoration fever, chest pain and breathlessness are the common symptoms occurring in three fourths of the patients of tuberculous pleural effusion. Most of the cases of Tuberculous effusion are above 30 years of age. In the diagnosis of tuberculous pleural effusion, Pleural fluid ADA is very important. Pleural fluid cytology, pleural biopsy, bronchoscopy, bronchial washings and sputum examination can aid in diagnosis of aetiology. Lung cancer is the commonest cause of malignant pleural effusions. Other causes of pleural effusion though rare should be considered in selective patients.

**KEYWORDS**

Tuberculous Pleural Effusion, Exudates, Cytology, Bronchoscopy, Malignant Effusions.

**ABBREVIATIONS**

HIV: Human immunodeficiency virus, ADA: Adenosine deaminase, LDH: Lactic dehydrogenase, FNAC: Fine needle aspiration cytology.

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**INTRODUCTION:** Pleural fluid arises from a number of Pulmonary and extrapulmonary problems. Pulmonary infections like Pneumonia, Tuberculosis, Malignancies of Lung and Pleura, Pancreatitis, Pulmonary thromboembolism, Oesophageal rupture, Hepatic and Splenic infections, Abdominal sepsis and Pancreatitis acute and chronic can be associated with pleural effusions.

Several malignancies like, carcinoma breast, osteogenic sarcoma, testicular and ovarian malignancies can be associated with pleural effusions. On the other hand, pleural fluid transudates are seen in congestive heart failure, cirrhosis of liver, hypoproteinaemia, sometimes in pulmonary thromboembolism secondary to atelectasis of lung. Pleural fluid aspiration and examination is a simple procedure and that can give enormous information regarding Pulmonary or extrapulmonary disease.

**AIMS AND OBJECTIVES:** To study the patients presenting with pleural fluid and identify the aetiology with the help of clinical radiological biochemical histopathological examination.

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**MATERIALS AND METHODS:** We have done a prospective study on the patients having pleural fluid attending Katuri Medical College Department of Pulmonary Medicine from 2013 April to 2015 June.

**Inclusion Criteria:** All the patients presenting with Pleural Fluid above 20 years of age.

**Exclusion Criteria:** Patients of Pleural fluid with severe comorbidities like HIV, unstable patients, moribund patients and terminal malignancies, severe hypoxia. Analysed pleural fluids using Light's criteria along with thorough clinical and radiological, haematological and biochemical examination. Sputum microscopy for AFB was done for all the patients. Pleural biopsy, bronchoscopy, bronchial washings were done selectively. Other investigations were done based on the requirement of the patients.

**RESULTS:**

Total number of cases of Pleural Fluid Examined	200
No. of cases of Exudates	182
No. of cases of Transudates	18

Aetiology	Total	Male	Female
	18	14	4
COPD Cor pulmonale	8	07	1
Cardiac Disease with CHF	4	03	01
Hypoproteinaemia	2	2	-
Associated with chronic renal impairment	2	1	1
Associated with generalised anasarca	2	1	1

**Table 1: Analysis of 18 Cases of Pleural Transudates**

Sl. No.	Aetiology	Total	Males	Females
1.	Tuberculosis	118/182=64.83%	86/182=47.25%	32/182=17.58%
2.	Primary or secondary malignancy	25=13.73%	18/182=9.89%	07=3.84%
3.	Pleural effusion secondary to pulmonary thromboembolism	03=1.65%	02=1.09%	01=0.55%
4.	Pleural effusion secondary to chronic pancreatitis	03=1.65%	03=1.65%	None
5.	Pleural effusion secondary to connective tissue disease	03=1.65%		03=1.65%
6.	Sympneumonic and parapneumonic effusions pleural effusions	18=9.89%	11=6.04%	07=3.85%
7.	Pleural effusion secondary to amoebic hepatitis	02=1.09%	02=1.09%	-
8.	Pleural effusion secondary to chronic renal failure	04=2.19%	02=1.09%	02=1.09%
9.	Pleural effusion after abdominal surgery	04=2.19%	03=1.65%	01=0.55%
10.	Undiagnosed	02=1.09%	02=1.09%	-

**Table 2: Analysis of Exudates**

Total No. of Exudates: 182.

Analysis of tuberculous pleural effusions among 118 cases of tuberculous pleural effusion, the following criteria were used for diagnosis. Patients met with multiple criteria. All the criteria together along with clinical and radiological examination.

Sl. No.	Criteria	No. of Cases	Percentage
1.	Clinical Features	96/118	81.35%
2.	Chest Radiology	44/118	37.29%
3.	Pleural Fluid ADA >40IU/L	101/118	85.59%
4.	Lymphocytic Predominance in Pleural Fluid	84/118	74.20%
5.	Sputum Positive for AFB	26/118	22.3%
6.	Bronchial Washings Positive for AFB	18/118	15.25%
7.	Pleural Biopsy	6/118	5.8%

**Table 3: Diagnosis of TB Pleural Effusion**

Sl. No.	Symptom	No. of Patients	Percentage
1.	Cough	82	69.49%
2.	Expectoration	59	50%
3.	Fever	80	67.79%
4.	Chest Pain	76	64.46%
5.	Haemoptysis	2	1.69%
6.	Breathlessness	78	66.10%
7.	Polyuria and Nocturia	9	7.63%
8.	Weight Loss	19	16.10%
9.	Loss of Appetite	26	22.03%

**Table 4: Symptomatology of Tuberculous Pleural Effusion Patients**

Duration of Symptoms	No. of Patients	Percentage
Less than 1 Month	47	39.83%
1-2 Months	15	12.71%
>2 Months	56	47.45%

**Table 5: Duration of Symptoms at the Time of Diagnosis of Tuberculous Pleural Effusions**

Age Group	Total No. of Patients	Male	Female
20-29	39 (33.05%)	27 (22.88%)	12 (10.16%)
30-39	33 (27.97%)	22 (18.64%)	11 (9.32%)
40-49	26 (22.03%)	21 (17.79%)	05 (4.24%)
50-59	14 (11.86%)	12 (10.17%)	02 (1.69%)
60 years and more	06 (5.08%)	04 (3.39%)	02 (1.69%)

**Table 6: Age and Sex Distribution of Tuberculous Pleural Effusion Patients**

Total No. of Patients of Tuberculous Pleural Effusion	No. of Patients of DM	Male	Female
118	16 (13.56%)	12 (10.16%)	4 (3.38%)
20-39 Age Group	04 (3.39%)	3 (2.54%)	1 (0.85%)
40-59 Years	09 (7.63%)	7 (5.93%)	2 (1.69%)
60 Years and Above	03 (2.54%)	2 (1.69%)	1 (0.85%)

**Table 7: Prevalence of Diabetes Mellitus among Tuberculous Pleural Effusion Patients**

Amount of Pleural Effusion as assessed by clinical, radiological and ultrasonographic examination among patients of Tuberculous Pleural Effusion. Total Number of Tuberculous Pleural Effusion: 118.

Amount of Pleural Effusion	No. of Patients	Percentage
Minimal (Obliteration of CP angle to 500 mL)	71	60.17%
Moderate (500 mL to 1000 mL)	33	27.97%
Large (>1000 mL)	14	11.9%

**Table 8**

Side of Effusion	No. of Patients	Percentage
Right sided	59	50%
Left sided	43	36.44%
Bilateral	16	13.56%

**Table 9: Side of the Lesion in Tuberculous Pleural Effusion**

Type of Pleural Effusion	No. of Patients	Male	Female
Free Pleural Fluid	80 (67.79%)	52 (44.06%)	28 (23.72%)
Encysted Pleural fluid	30 (25.42%)	28 (23.72%)	02 (1.69%)
Multiple Encystments	08 (6.77%)	06 (95.08%)	02 (1.69%)

**Table 10: Type of Tuberculous Pleural Effusion**

Sl. No.	Aetiology	No. of Cases	Percentage
1.	Pleural effusion secondary to Primary Pulmonary Malignancy	21	84%
2.	Secondary to ovarian malignancy	1	04%
3.	Secondary to carcinoma breast	2	08%
4.	Secondary to osteogenic sarcoma	1	04%

**Table 11: Analysis of Cases of Malignant Effusions: Total No. 25**

**DISCUSSION:** Exudative pleural effusion poses a diagnostic challenge as several pulmonary and extrapulmonary causes lead to pleural exudates. Diagnosis exudates and transudates is routinely done on the basis of Light's criteria,<sup>1</sup> but multiple parameters have to be considered in separating exudates and transudates.<sup>2</sup> Other parameters like pleural fluid albumin, cholesterol and comparison of pleural fluid and serum proteins and LDH can help in the differentiation. Some Indian authors have suggested limited criteria like cholesterol and LDH.<sup>3</sup> In our study of 200 patients, exudate constituted 91%. Total male patients exceeded female patients in several Indian studies also found predominant number of exudates and more number of male patients possibly because more male patients seek medical assistance.<sup>4</sup> Manu Mohan K et al<sup>5</sup> have similar observations as in our study. Tuberculosis is the predominant cause of pleural effusion in our study occurring in 64% of patients. Other important causes included sympleumonic and parapneumonic effusions and malignancy.

Analysis of tuberculous pleural effusions in our study showed clinical features combined with pleural fluid ADA and lymphocytic predominance in pleural fluid helped in the diagnosis of tuberculous aetiology. Other criteria like chest x-ray showing tuberculous shadows, sputum for AFB and bronchial lavage, fluid positive for AFB also helped in the

diagnosis of tuberculous pleural effusion. Our study showed a male predominance, but predominant number of patients were in the above 30 years age group. Symptomatology varied in different studies. Cough, fever, chest pain and breathlessness are the predominant symptoms in our study occurring in predominant number of patients. Pleural effusion is predominantly right-sided in our study. 14% of the patients showed bilateral pleural effusions. Mohd Arif, Srivastava study<sup>6</sup> had 60% of TB pleural effusions and they were in 20-40 years age group. In our study, 51% of the patients are below 39 years age. About 13.56% of our Tuberculous pleural effusions have associated diabetes mellitus, which is probably similar to prevalence of diabetes mellitus in South India.<sup>7</sup> Predominant patients of Tuberculous effusion patients had minimal pleural effusion of less than 500 mL as assessed by chest radiology and ultrasonographic examination.

This is because of better awareness of the patients and their seeking medical attention relatively early. 68% of our patients had free fluid and 32% had encysted effusion. This aspect is given attention because free fluid can be removed freely and with treatment patients have minimal pleural fibrosis and minimal restriction later on. C.H.S. Chan et al in their retrospective study found that only 6% of patients developed pleural thickening.<sup>8</sup> In our study, we had 6.77% of patients had multiply encysted pleural effusion, which can probably responsible for pleural thickening in subsequent years. Chan study from Hong Kong showed average age of Tuberculous pleural effusion was 44 years and that pleural biopsy is a better method of diagnosis and pleural fluid AFB was negative in all subjects. Pleural fluid ADA is more than 40 IU/L 85.6% of our tuberculous pleural effusion patients. This makes it an important tool in the diagnosis though there were a few borderline cases, which were decided on other diagnostic modalities. The importance of pleural fluid ADA was stressed in a number of studies. Sravan Kumar and Ritesh Agarwal study found poor utility, sensitivity as a diagnostic tool in diagnosing tuberculous and nontuberculous pleural effusion patients in chronic Kidney disease patients compared to DNA PCR.<sup>9</sup> Sachin Kate and B. K. Muthaa et al<sup>10</sup> in their study found a sensitivity and specificity of 93.3% and 90% respectively when ADA levels of 40 IU/L was taken as the criteria for the diagnosis of Tuberculous pleural effusion. Dr. Prabhakar Rao et al<sup>11</sup> also found Pleural fluid ADA as a very sensitive and specific marker of tuberculous pleural effusion and is simple, inexpensive and rapid.

Rama Saha et al<sup>12</sup> in their study stressed the importance of cytology of pleural fluid and histopathology of pleural biopsy specimen in the diagnosis of pleural effusions. We did pleural biopsy for only 8 patients and 6 of them were positive for tuberculosis. Among our Pleural effusions of other cause primary and secondary malignancies accounted for 13.65% and sympneumonic and parapneumonic effusions accounted for 9.89%. Other causes of pleural effusions were chronic pancreatitis, amoebic hepatitis, post abdominal surgery effusions, chronic renal impairment and pleural effusions secondary to connective tissue disease. Malignant effusions

were diagnosed by evidence of pulmonary and extrapulmonary malignant disease and analysis of pleural fluid and by pleural biopsy, bronchoscopy and bronchial washing, FNAC of lung lesions. Mohd Arif Siddiqui study<sup>6</sup> showed parapneumonic effusions of 14.5% and malignant pleural effusions of 11.5% and the results in this regard are similar to our study. Arnab Maji et al<sup>13</sup> in their study had higher percentage of malignant pleural effusions of around 28% in their study of 568 patients of exudative Pleural effusions. Lung malignancies are the commonest cause of malignant pleural effusions in our study and also in Arnab Maji study,<sup>13</sup> Basu A chakraborty I et al<sup>14</sup> concluded the importance of pleural biopsy and ADA level and found that ADA levels of 70 IU/L are highly suggestive of tubercular aetiology. It requires extensive investigations when pleural effusions are found positive for secondary malignancy as a wide number of organs can cause secondary malignancy in the pleura.

Pleural effusions can also occur from obstruction of thoracic duct or pleural lymphatics secondary to malignant extension. In such cases, pleural fluid may not be positive for malignancy. Pleural effusions can occur in Chronic Kidney disease and it is necessary to differentiate Tuberculous pleural effusion from other causes. We had only small number of patients of pleural effusion associated with Chronic Kidney Disease. In a study among the CKD patients by Ray S, Mukherjee S. et al, they found a prevalence of 6.7% of pleural effusion among CKD patients. It is necessary to rule out Tuberculous pleural effusion in CKD patients.<sup>14</sup> Massive recurrent pleural effusions can develop in asymptomatic pancreatic disease.<sup>15</sup> Pleural effusions acute respiratory distress syndrome associated with atelectasis and hypoxia can develop in acute pancreatitis.<sup>16</sup> Chronic massive effusions are reported with chronic pancreatitis.<sup>17</sup> Pleural effusions of pancreatic origin are rich in pancreatic amylase.

Pleural effusion accompanying amoebic hepatitis and liver abscess is not uncommon in clinical practice. Though we have only two cases in our study group because of habit of alcoholism and high prevalence of amoebic hepatitis pleural effusion of this aetiology should be borne in mind in relevant cases. It can result because of extension of amoebic liver abscess into pleural cavity and lung<sup>18</sup> or can be reactionary effusion. Pleural effusions are also reported postoperatively after upper abdominal surgery can result from infection, atelectasis, sodium and water retention or age-related cardiac disease.<sup>19</sup> They do not require any specific treatment. In our series, we had four patients after abdominal surgery. Pleural effusions are also reported after CABG and cardiac valve surgery. They cause dyspnoea and chest pain and fever are uncommon, they disappear gradually over a few months.<sup>20</sup>

**SUMMARY AND CONCLUSIONS:** We have studied 200 cases of pleural fluid in our tertiary care centre. 91% of them were found to be exudates. 9% are transudates. Transudates are seen in COPD cor pulmonale, Cardiac disease with CHF, Hypoproteinaemia and Chronic renal

failure. Predominant cause of exudates is Tuberculosis occurring in 64.83% followed by primary or secondary malignancy (13.65%) and sym and parapneumonic effusions 9.89%. Other causes of pleural effusions included postoperative pleural effusions after abdominal surgeries, chronic pancreatitis, amoebic hepatitis, connective tissue disease, pulmonary thromboembolism and chronic renal failure.<sup>21</sup> Tuberculous pleural effusions are diagnosed by analysis of pleural fluid by microscopy, cytopathology, pleural fluid ADA, proteins, LDH, sputum microscopy and in selective cases by bronchoscopy and analysis of bronchial washings. Relevant history and extensive systemic examination is necessary in nontuberculous effusions.

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