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Types of pleural effusion among patients attending respiratory medicine department, rims, Imphal

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Abstract

Pleural effusion is a common clinical problem with different possible causes. It can be due to systemic, local, infectious and non-infectious causes. Aetio logical diag nosis is crucial for the treatment. This study was carried out to study the types of pleural effusion among patients attending Respiratory Medicine Out Patient Department (OPD), RIMS, Imphal and to describe the characteristics of different types of pleural effusion. It was a cross sectional study conducted for a period of 2 years. A total of 205 cases of newly diagnosed pleural effusion were taken in the present study. In our study, we found that exudative effusion is the most common cause of pleural effusion of which tubercular effusion (41%) is the most common followed by malignancy (32.3%), parapneu monic effusion (6.8%), CCF (5.4%) and CKD (5.4%). Exudative effusions were far more common than transu dative effusions. In our study, most patients were found

to be in the age group of 51- 60 years. Among malignant effusions, lung cancer accounts for more than two thirds of malignant pleural effusion in our study, among which adenocarcinoma is the most common cause. In our study, most of the effusions were unilateral (more on the right side). In most of the tuber cular effusions, pleural fluid ADA was > 30 (95.2%). Pleural fluid ADA levels are highly sensitive with good specificity for the diagnosis of etiology of tubercular effusions. Every case of pleural effusion should be meticulously investigated in order to arrive at a diagnosis of the underlying disease and to proceed for specific therapy at the earliest.

Keywords: Pleural Effusion, exudative, transudative, tubercular, adenocarcinoma, ADA

Introduction

Pleural effusion is the abnormal collection of fluid in the pleural space, which is a potential space between visceral pleura, covering the lung and parietal pleura, covering the chest wall. Pleural space contains nearly 5-10 ml of pleural fluid in healthy individuals.[1] Pleural fluid is a clear colourless fluid which is an ultrafiltrate derived from capillaries, produced continuously at a rate depend ing on capillary hydrostatic pressure, plasma oncotic pressure and capillary permeability.[2] It is reabsorbed through the lymphatics and venules of visceral pleura.[3]

Pleural effusion is a common clinical condition en countered in everyday practice.[4] It can be associated with different medical conditions that causes fluid accumu lation via different mechanisms like increased pulmonary capillary pressure, decreased oncotic pressure, increased pleural membrane permeability and obstruction of lym phatic flow.[5]

A pleural effusion can be transudative or exudative. A transudate develops when fluid from the pulmonary capillaries moves into the pleural space. The fluid is thin, watery, containing a few blood cells and little protein. The pleural surfaces are not involved in producing the transudate. In contrast, an exudate develops when the pleural surfaces are diseased. The fluid has a high protein content and cellular debris. Exudate is usually caused by inflammation, infection or malignancy.[6] The common transudative causes of pleural effusion are left ventricular failure, cirrhotic liver disease, peritoneal dialysis, hypo al buminaemia, nephrotic syndrome, pulmonary embolism, hypo thyroidism and mitral stenosis.

The common exudative causes are tuberculosis, para pneumonic effusions, malignant neoplasm, pulmonary embolism, rheumatoid arthritis, pancreatitis and auto immune diseases etc.[7]

The clinical features of pleural effusion are dyspnoea, chest pain and cough (productive or non-productive). The physical signs include tachypnoea, reduced chest wall movement on the affected side, stony dullness on percussion, reduced or absent breath sounds and vocal resonance. Large effusions cause displacement of the trachea and mediastinum to the opposite side.[6,8]

Establishing the aetiology of pleural effusion should follow a logical and simple diagnosing algorithm. So, the diagnosis starts with clinical history, doing physical examination and followed by radio logical examinations and pleural fluid analysis in appropriate cases. In necessary instances, further investigations like computed Tomo graphy (CT) thorax, echocardiography, thoraco scopy, pleural biopsy or bronchoscopy can be done.

The present study is carried out to identify the types of pleural effusion and to describe the characteristics of the patients with pleural effusion, attending Respiratory Medicine Out Patient Department, Regional Institute of Medical Sciences, Imphal.

Aims and objectives

- To identify the types of pleural effusion.

- To describe the characteristics of the patients with different types of pleural effusion

Materials and methods

This study was a hospital based cross sectional study conducted from January 2021 to December 2022. 205 patients of both gender who attended Respiratory Medicine OPD, RIMS with clinical features suggestive of pleural effusion and ultimately confirmed by pleural fluid aspiration and analysis were included in this study.

Ethical approval from the Institution and valid informed consent from the patient were taken.

Detailed histories of all the patients who participated in the study were recorded. They were subjected to thorough detailed clinical examination; routine investig ations like LFT, KFT, serum LDH and Mantoux test were done for all patients. Chest X-ray PA view was also advised. All the patients were subjected to Diagnostic pleurocentesis i.e.,

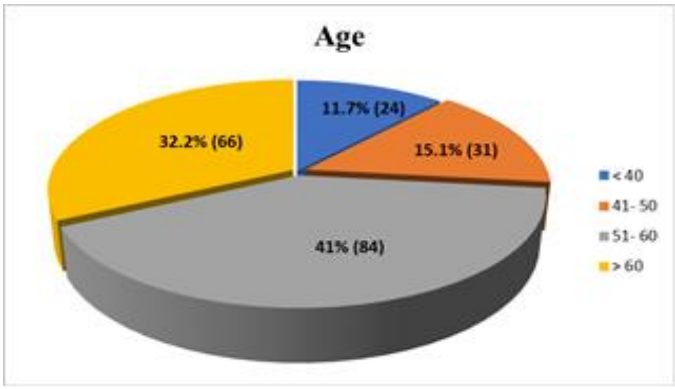
under strict aseptic precautions, a minimum of 10 ml of pleural fluid was aspirated and sent for biochemical, micro biological and pathological analysis. Pleural fluid protein, LDH and ADA were measured for all patients. Pleural fluid cell count, cytology, Pleural fluid gram staining, AFB staining, CBNAAT, culture and sensitivity tests were also done for all the patients.

Data was analysed using SPSS V21 for windows. A p-value of less than 0.05 was considered statistically signifi cant.

Results

A total number of 205 patients were included in this study conducted in the department of Respiratory Medicine, RIMS, Imphal during the study period of January 2021 to December 2022.

Figure 1: Age distribution of participants (N= 205)



- Maximum participants were in the age group of 51-60 years (41%) followed by the age group >60 years (31.2%).
- Mean age was 58.15 ± 29.321 years.

Figure 2: Clinical symptoms at presentation (N= 205)

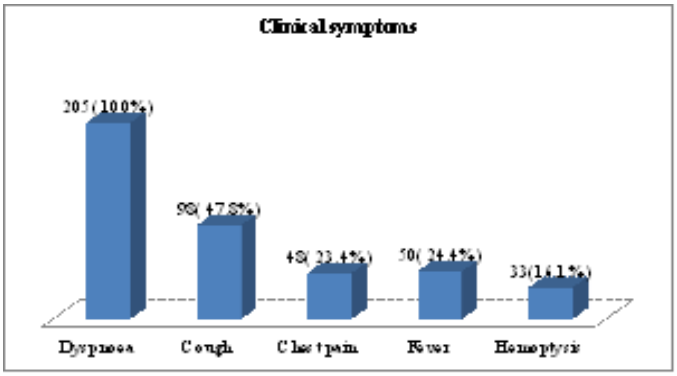


Figure 2 shows dyspnoea was the most common pre senting symptom (100%), followed by cough (47.8%), chest pain (23.4%), fever (24.4%) and Haemoptysis (16.1%) in our study.

Figure 3: Distribution of types of pleural effusion (N= 205)

Figure 3 shows unilateral effusion 164 (80%) is common among study participants than bilateral effusion 41(20%).

Figure 4: Distribution of type of pleural effusion (N= 205)

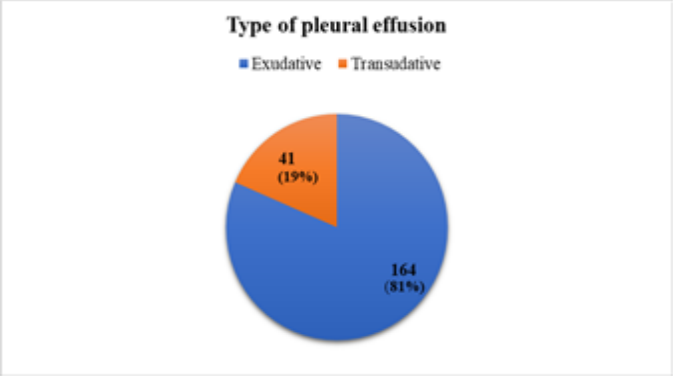


Figure 4 showing exudative pleural effusion is common among study participants (n= 164) - 81% than transu dative effusion (19%).

Figure 5: Distribution of the colour of pleural effusion (N=205)

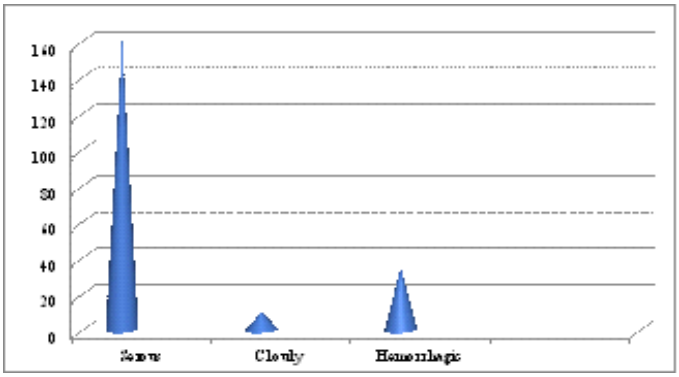
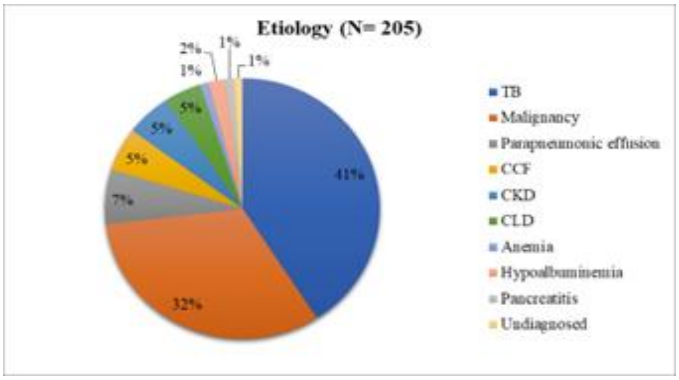


Figure 5 shows that serous pleural effusion was common in our study- 78% (n=160), followed by Haemorrhagic- 17.1% (n= 35).

Figure 6: Etiology of pleural effusion (N= 205)



In our study tuberculosis is the most common cause of pleural effusion (41%), followed by malignancy (32.3%) and parapneumonic effusion (6.8%).

Figure 7: Pleural fluid ADA in tubercular effusion (N = 84)

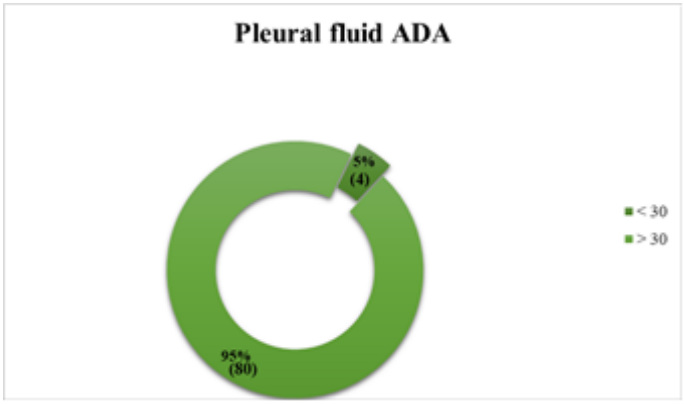


Figure 7 shows pleural fluid ADA was > 30 in most of the tubercular pleural effusions (95.2%)

Figure 8: Pleural fluid LDH in tubercular effusions (N= 84)

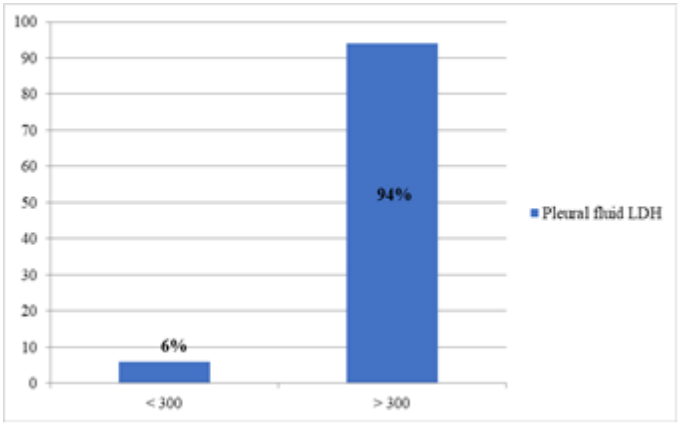


Figure 8 showing elevated pleural fluid LDH > 300 in tubercular pleural effusions.

Table 1: Pleural fluid AFB/ CBNAAT positivity (N= 84) in tubercular pleural effusion

Pleural fluid AFB/ CBNAAT	Frequency	Percentage (%)
Positive	7	8.3
Negative	77	91.7

Table 1 showing pleural fluid CBNAAT/AFB positivity in tubercular effusion is less (8.3%).

Table 2: Colour of malignant pleural effusion (N= 66)

Colour	Frequency (n)	Percentage (%)
Serous	17	25.7
Haemorrhagic	49	74.3

Table 2 showing Haemorrhagic effusions were common in malignancy (74.2%).

Table 3: It shows association of colour of pleural fluid with malignant effusion (N= 205)

Etiology	**Colour of pleural effusion**		**P value**
	Serous(%)	Hemorrhagic	
Malignancy	25.7	74.3	0.02
Non-malignant causes	81	19	

Table 4: Pleural fluid malignant cell/ cell block cytology in malignant pleural effusion (N= 66)

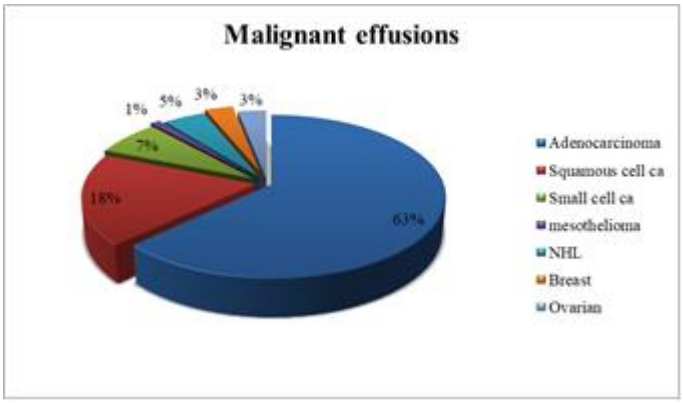
Pleural fluid malignant cell/ CBNAAT	Frequency (n)	Percentage (%)
Positive	20	30.3
Negative	46	69.7

Table 4 shows pleural fluid malignant cell/ cell block cytology positivity was 30.3% (20) in our study.

Figure 9: Smoking status of participants with malignant pleural effusion (N= 66)

Figure 9 shows most of the patients with malignant pleural effusion were smokers (58%).

Figure 10: Etiology among malignant pleural effusions (N= 66)



Lung cancer (89.3%) is the most common cause of malignant pleural effusion in our study among which adenocarcinoma (62%) being the most common cause, followed by squamous cell carcinoma (18%).

Discussion

Pleural effusion is a common clinical entity which can be a primary manifestation or a secondary complication of many disorders.[14] However, the etiology of pleural effusion remains unclear in nearly 20% of cases.[12] The findings in this study could, therefore, serve to identify the types of pleural effusion and to describe the chara cteristics of the patients with different types of pleural effusion.

This cross-sectional study was conducted in the Depart ment of Respiratory medicine, RIMS, Imphal during a period of two years. A total of 205 cases of diagnosed pleural effusion were taken in the present study.

Among all the cases (n=205), the exudative effusion cases were far more common than the transudative ones (81% vs 19%) which is similar to the study conducted by Khan F et al[11] which showed that 79% of pleural effuse ons were exudative and 21% were transudative.

In our study, most patients were between the age group of 51- 60 years. Mean age was 58.15 $\pm$ 29.321 years which is comparable with the study conducted by Reddy SL et al[13] in Hyderabad. More than half of the study

population were males (61%) with a male to female ratio of 1.5:1. A study in Qatar by Khan et al[11] showed that the mean age of the study population was 57.4 ± 18.2 years and male-to-female ratio was 1.3:1. In our study, tuber cular (64.3%) and malignant pleural effusion (64.6%) were common in males.

Present study shows that dyspnoea was the most common presenting symptom (100%), followed by cough (47.8%), chest pain (23.4%), fever (24.4%) and Haemoptysis (16.1%). This corroborate with the study conducted by Reddy SL et al[15] which showed that the most common presenting symptom was dyspnoea (84%) followed by cough (80%), fever (65%) and chest pain (43%). Similar study by Al-Alusi et al[14] included 100 patients in their study, of which the most common symptoms were dyspnoea (87%), cough (86%), fever (79%) followed by chest pain (67%).

In our study, tuberculosis is the most common cause of pleural effusion (41%), followed by malignancy (32.3%), para pneumonic effusion (6.8%), CCF (5.4%) and CKD (5.4%). Two patients had anaemia (1%), four had hypo albuminemia (2%), two had pancreatitis (1%) and two were undiagnosed. This data is consistent with the findings from Kalaajieh WK et al[10] which shows that the most frequent cause of exudative pleural effusion was tuberculosis (43.7%), followed by malignancy (32.1%). Another study conducted by Bar PK et al[9] shows the most common etiology as tuberculosis (64.67%), followed by malignancy (14.67%), parapneumonic effusion (7.33%), cardiac failure (5.33%) and other minor causes. Among malignant effusions, lung cancer (89.3%) was the most common cause of malignant pleural effusion in our study, among which adenocarcinoma (62%) was the most common cause, followed by squamous cell carcinoma (18%). This is comparable to the findings of the study by Bar PK et al[9] which shows that the most common cause of malignant pleural effusion was Carcinoma of Lung accounting for half of all cases of malignancy (11 out of 22 cases) and among them, adenocarcinoma of lung was the most frequent. Whereas in a study conducted by Shimon Izhakian et al[20], the major cause for exudative pleural effusion was malignant effusion 53.1%. The present study showed lesser frequency of transudative effusion. It may be due to the fact that the study was conducted at Respiratory Medicine department of a teaching hospital where most of the cases of cardiac failure, cirrhosis, hypoproteinemia may have attended in the cardiology or general medicine department after segre gation from general outpatient department or emergency room.

In our study mean ADA was 34± 15.6 with a range of 1 to 78. In most of the tubercular effusions, pleural fluid ADA was > 30 (95.2%). Gupta et al[15], in their study showed that in tuberculous group the mean ± SD of ADA was 67.34 ± 22.85, while in nontuberculous group, it was 18.60 ± 9.12, which was statistically significant. In our study, the mean ADA value in parapneumonic effusion group was higher than tuberculous effusion group and this can be explained by the fact that differentiation between parapneumonic effusions and empyema was not done owing to high ADA levels. In a similar study by Valdés et al[16] the mean ADA concentration in the patients with tuberculous effusion was 111.1 U/I and in empyema it was 139.7 U/I. Hence, pleural ADA carries high diagnostic importance for tuberculosis and it should be done wherever possible. ADA levels were elevated not only in TB lymphocytic effusions but also in neutrophilic effusions. Extremely high ADA levels were seen in lymphoma and empyema.

Bacteriological confirmation for Mycobacterium tuber culosis in pleural fluid culture is often not obtained because the mycobacterial population in tuberculous

pleural effusion is generally small and cultures of pleural fluid specimens are generally positive in only up to about 30% of cases.[21]

In our study most of the effusions were unilateral (80%). In 122 patients (59.5%), pleural effusions occurred only on the right side of the thorax; in 42(20.4%), only on the left; and in 41 (20%), both sides were involved. Most types of pleural effusions showed a preference for the right side. Tuberculous pleural effusions were right sided in 62.2% of patients, while malignant effusions were right sided in 65.5% of patients. These findings are comparable to a study conducted by Berger HW et al[33] and Scharer L[19].

In this study pleural effusion due to CCF were mostly bilateral (63.6%) followed by right sided effusion (36.3%) which is similar to Race et al[17] who reported that 88% of these effusions were bilateral, only 8% being limited to the right side and 4% to the left.

Conclusion

Pleural effusion is a common disease confronting the physicians, and knowing its etiology will help to improve the therapeutic options.

In our study, we found that exudative effusion is the most common cause of pleural effusion, with tubercular effusion (41%) as the most common cause followed by malignancy (32.3%), parapneumonic effusion (6.8%), CCF (5.4%) and CKD (5.4%). Exudative effusions were far more common than transudative effusions. In our study most patients were found to be in the age group of 51- 60 years. Mean age was 58.15 $\pm$ 29.321 years and male to female ratio was 1.5:1. Tubercular (64.3%) and malignant pleural effusion (64.6%) were common in males.

Among malignant effusions lung cancer accounts for more than two thirds of malignant pleural effusion in our study, among which adenocarcinoma being the most common cause. In our study, most of the effusions were unilateral (more on the right side).

In most of the tubercular effusions, pleural fluid ADA was > 30 (95.2%). Pleural fluid ADA levels are highly sensitive with good specificity for the diagnosis of etio logy of tubercular effusions. However, in view of high levels of ADA in parapneumonic effusions also, other measures such as clinical evaluation, differential counts and glucose levels are necessary to separate both these entities.

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