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Clinico-Etological Study of Pleural Effusion with Special Reference to Elderly

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Abstract: ***Background: Pleural effusion is defined as excessive or abnormal accumulation of fluid in the pleural space. Pleural effusion can be exudative or transudative. Hence, determining the etiological and clinical profile of pleural effusion helps in adoption of diagnostic and therapeutic approach. Objective: This study aims to the clinical and etiological profile of patients with pleural effusion admitted in a tertiary care centre. Materials and Methods: A prospective study of 100 patients of pleural effusion above 18 years of age was conducted. Detailed history, physical examination, radiological investigations and diagnostic pleurocentesis was carried out. The effusions were then appropriately classified as transudative and exudative and further evaluated. Results: The incidence of disease was highest in the age group 41-50 years. Males (58%) were more commonly affected. Breathlessness (84%) was the most common symptom. Exudative pleural effusions (85%)were more common. Tuberculous pleural effusion (75.29%) was the most common cause in cases of exudative effusion. Adenosine deaminase has a crucial role in diagnosing tuberculous pleural effusion. The most common cause of transudative pleural effusion was decompensated liver disease (33.33%). Tuberculosis (52%) was the most common cause of pleural effusion in elderly patients also. Right sided pleural effusions (45%)were more common. Conclusion: Tuberculosis is one of the common causes of exudative pleural effusion followed by parapneumonic effusion and malignancy. Transudative effusions are mostly bilateral. Common causes of transudative pleural effusions are decompensated liver disease, congestive cardiac failure and uraemia.***

Keywords: Pleural effusion, tuberculosis, exudative

1. Introduction

Pleural effusion is defined as excessive or abnormal accumulation of fluid in the pleural space. Pleural space is a potential cavity encased between the visceral and parietal pleura[1]. Pleural effusion is always abnormal and its presence indicate an underlying disease. The normal pleural space contains 7 to 14ml fluid[2]. Pleural fluid is an ultrafiltrate derived from the capillaries of the parietal pleura. It is reabsorbed through the lymphatic and venules of visceral pleura. Pleural fluid has a specific gravity of 1.010-1.026, pH of 6.8-7.6, protein of 1.5g/dL with an albumin 50-70% and globulin of 30-45%. An increased amount of fluid accumulates in the pleural space when the rate of formation exceeds the rate of removal. Increased formation happens when the permeability of the pleural capillaries increases abnormally or when the net hydrostatic pressure gradient (transudate) rises[2,3]. Additionally, abdominal fluid leaking across the diaphragm might cause pleural fluid to accumulate[2]. Reduced lymphatic drainage is the cause of the removal's reduction. Because there are many different differential diagnoses, an integrated approach to the investigations is required. Pleural effusions can be exudative or transudative[4,5]. In cases with transudative pleural effusion the diagnosis is usually easy but exudative pleural effusion needs careful differential diagnosis that includes parapneumonic effusion, tuberculosis, malignancy and others[6,7,8].

Determining the etiological and clinical profile of pleural effusion helps in adoption of regionally optimized diagnosis and therapeutic approach. Possible symptoms include pleuritic chest pain, dyspnea and a dry, unproductive cough.History of fever, weight loss, smoking, cardiac, renal or hepatic illness may point towards the etiology. History of connective tissue disorders and certain long-term medications like amiodarone[9], isoniazid[10], nitrofurantoin and phenytoin should also be taken. Physical findings include signs of volume gain, reduced tactile vocal fremitus, dullness on percussion, shifting dullness and diminished or absent breath sounds[11]. Shifting dullness will be absent in loculated effusions and massive effusions. In massive effusion there will be mediastinal shift.

Standard posteroanterior and lateral chest radiography remains the most important technique for the initial diagnosis of pleural effusion[12]. The amount of fluid to be evident on posteroanterior film is 200ml, whereas costophrenic angle blunting can be appreciated on a lateral film when approximately 50mL of fluid has accumulated. Classically, a homogeneous opacity is seen with the obliteration of the costophrenic angle and a curved upper border, i.e., Elle's S shaped curve. small amounts of pleural effusion can be detected accurately by ultrasonography[11]. Ultrasonography can be helpful in cases of loculated pleural effusion for confirmation of the diagnosis and for marking the site for thoracocentesis. Computed Tomography (CT) scanning with its cross-sectional images can be used to evaluate complex situations in which the anatomy cannot be fully assessed by plain radiography or ultrasonography[13]. Thoracocentesis should be performed in all patients with more than minimal pleural effusion (larger than 1 cm in height on lateral decubitus radiography, ultrasonography or CT) of unknown origin. Diagnostic pleural tap with biochemical, cytological and microbiological examination of the fluid is needed for correct diagnosis. The routine pleural fluid evaluation usually includes determination of protein, pH, LDH, glucose and albumin levels, with adenosine

deaminase and cell count for differential and cytological examination[14]. Hence, a detailed clinical evaluation including history taking, physical examination and relevant diagnostic tests are essential to identify the cause of pleural effusion, which is essential for arriving at the diagnosis and treatment decision.

2. Materials and Methods

This was a hospital based observational, prospective and cross-sectional study carried out by the department of General Medicine, Jorhat Medical College and Hospital in the study period of one year from July 2021 to June 2022 with prior permission and approval from the institutional Ethics Committee. Study participants werethose patients who were clinically and radiologically diagnosed with pleural effusion and admitted in the hospital. Sample size calculation was done as per the previous records, sampling method used was consecutive sampling and considering the inclusion and exclusion criteria average number of patients per monthwere 16. Therefore, the required sample size was estimated as 100 using EPITOOLS software under 95% confidence interval and 10% precision.

For patient selection, inclusion criteria were:- 1) Patients of both gender of more than 18 years of age with clinical, radiological features of pleural effusion and confirmed by pleurocentesis admitted in the Department of General Medicine and Pulmonary Medicine. 2) Patients who had given valid consent. The exclusion criteria were 1) Patients of pleural effusion already undergoing treatment. 2) Trauma chest and chylothorax. 3) Hemodynamically unstable patients. 4) Patients who did not give consent. 5) Coagulopathy.

The study method included detailed history of chief complaint, present and past illness and drug history with thorough physical examination. Routine blood and urine investigations, chest x ray, sputum analysis wherever applicable and pleural fluid analysis was done. Special investigations like CT scan of chest or FNAC/biopsy of lymph node/lung mass were carried out when relevant to supplement the diagnosis.Classification was done based on the Lights criteria, the effusion was said to be an exudate if they meet at least one of the following and transudate meets none of these criteria.

Lights Criteria[15]:

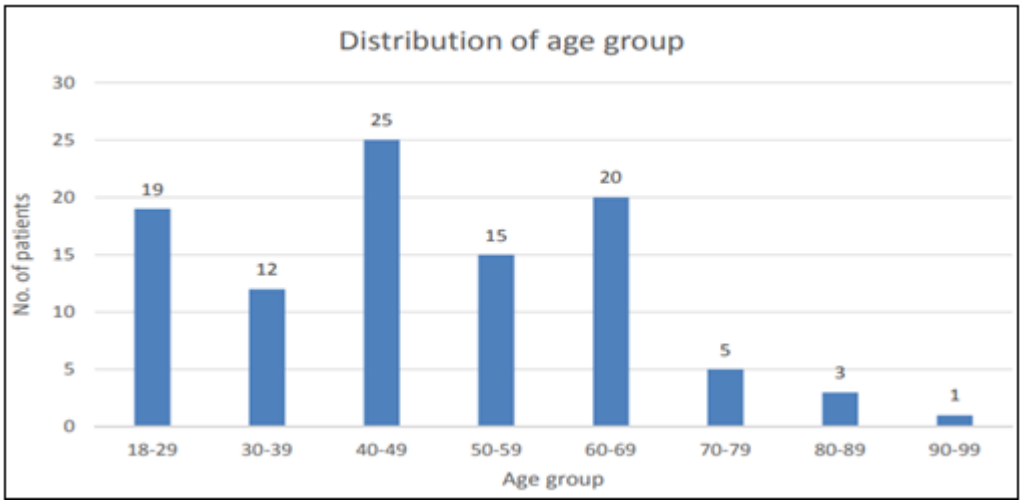
a) Pleural fluid protein/serum protein>0.5.
b) Pleural fluid LDH/serum LDH>0.6.
c) Pleural fluid LDH more than two-thirds of normal upper limit for serum LDH.

Written Informed Consent was taken from all the subjects enrolled in the study. All the data were kept confidential and handled only by the investigator and authorized people.

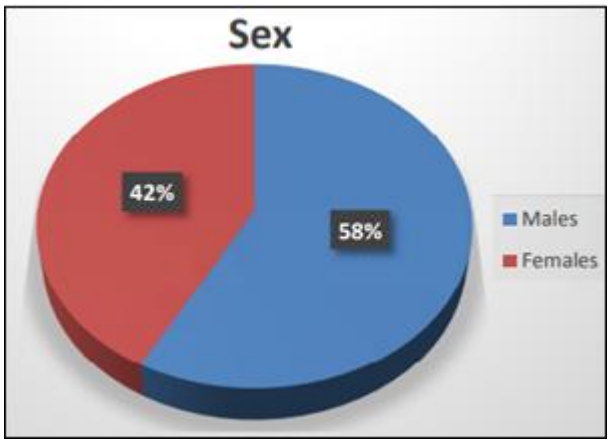
For statistical analysis all data were compiled and entered in Microsoft Excel and was analysed for corrections. Further the corrected data was evaluated using SPSS 21 and the results were obtained in the form of percentage and frequencies.

3. Results and Observations

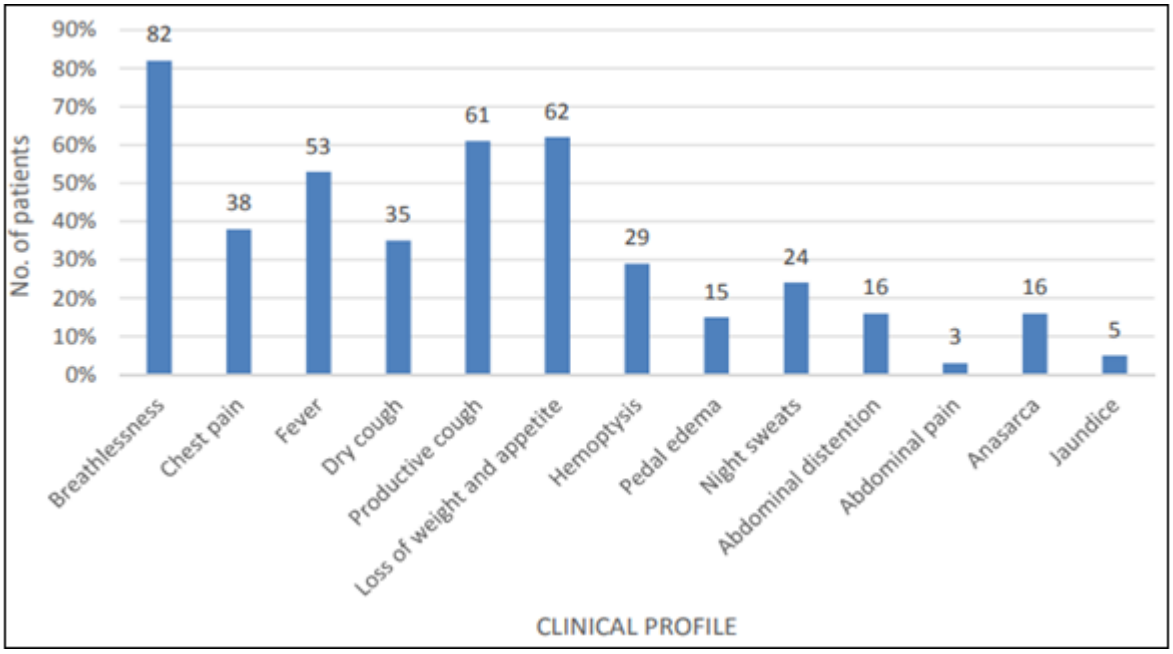
The age of the patients in the study varied from 18 years to 90 years. The incidence of pleural effusion was highest in the age group 40-49 years.



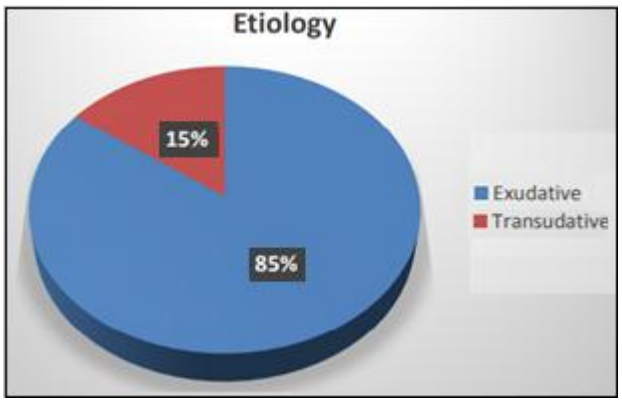
Among the study participants, 58 were males and 42 were females, the ratio being 1.38:1.



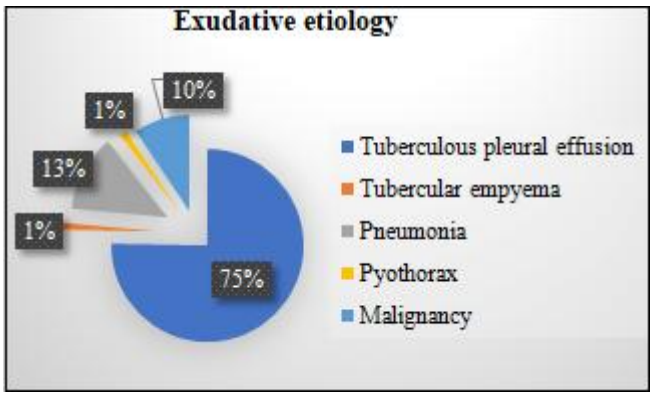
The most common presenting symptom was breathlessness (82%), followed by loss of weight (62%) and productive cough (61%).



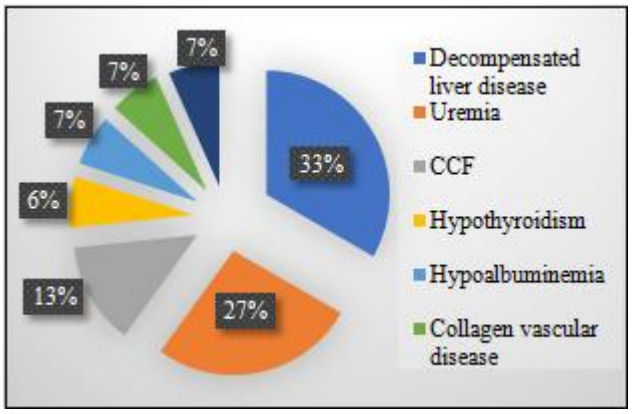
Out of 100 cases, 85 cases were of exudative etiology and 15 cases were of transudative etiology.



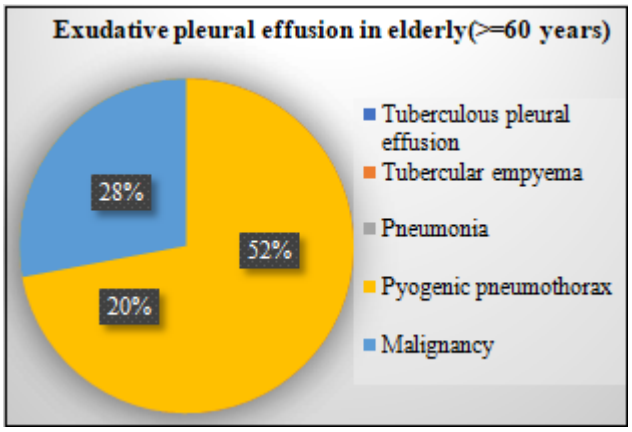
Among the 85 cases of exudative etiology most common cause was tuberculous pleural effusion which was 64(75.29%), followed by pleural effusion secondary to pneumonia which was 11(12.94%) followed by malignant pleural effusion which was 8(9.41%). The remaining two causes were tubercular empyema and pyothorax which was 1(1.17%).



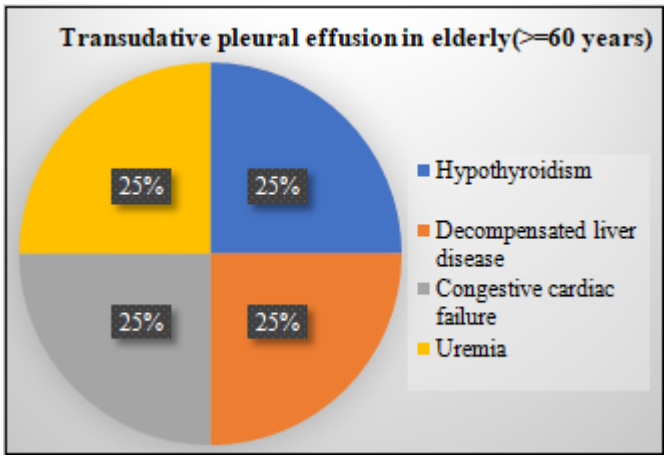
Among the 15 cases of transudative etiology most common cause of transudative pleural effusion was decompensated liver disease 5(33.33%), followed by uremia 4(26.66%), followed by congestive cardiac failure 2(13.33%). The other causes were collagen vascular disease, hypoalbuminemia, pancreatitis and hypothyroidism which were 1(6.66%).



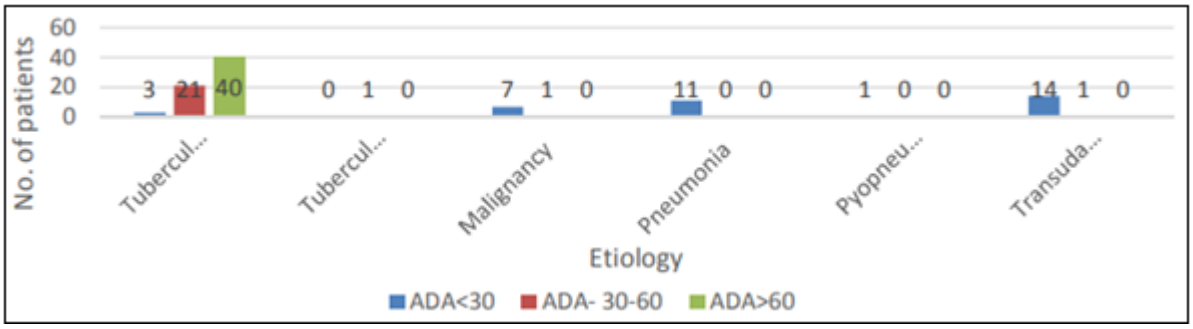
In this study, total number of exudative pleural effusion in the elderly was 25 out of which 13(52%) patients had tuberculous pleural effusion, 7(28%) patients had malignancy, 5(20%) patients had pneumonia.



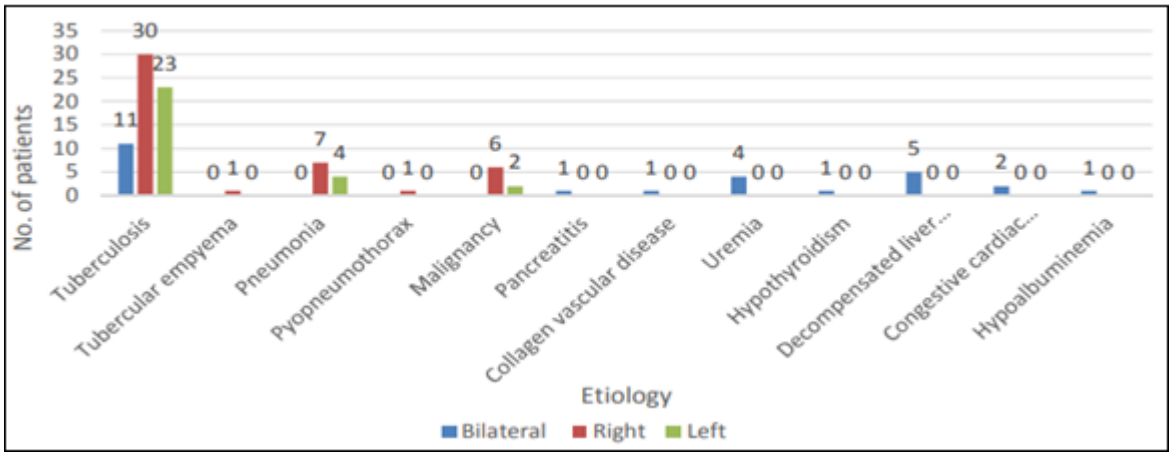
Out of 4 patients of transudative pleural effusion in the elderly age group, the causes of transudative pleural effusion were decompensated liver disease 1(25%), uremia 1(25%), congestive cardiac failure 1(25%), hypothyroidism 1(25%).



Majority of patients having tuberculous pleural effusion had ADA values of greater than 30. 61(95.31%) patients out of 64 were having ADA values suggestive of tuberculous pleural effusion.



Among the 100 cases, 45 were right sided, 29 were left sided and 26 were bilateral pleural effusions.It was seen that right sided pleural effusions were more common in the study.



4. Discussion

In this study, out of 100 patients the incidence of pleural effusion was maximum in the age group 40-49 years which is comparable to a similar study by **Jayant K Golwalkar et al**[16]. There were 58 males and 42 females in our study, the ratio being 1.38. This is similar to study done by **Manu Mohan K et al**.[17]where they found pleural effusion occured more in male population.The most common clinical presentation was breathlessness in 82% patients that included both elderly and young patients which was similar to a study by **Laxman Reddy et al**.[18] where breathlessness occurred in 84% patients. Other symptoms were fever (53%), chest pain (38%), dry cough (35%), hemoptysis (29%), night sweats (24%), abdominal distention (16%), anasarca (16%), pedal edema (15%), jaundice (5%) and abdominal pain (3%). In the present study exudative pleural effusion was more common than transudative pleural effusion. Out of 100 cases, exudative pleural effusion was 85(85%) and transudative pleural effusion was 15(15%) which is in accordance to a study conducted by **Ibrahim A et al**.[19]where 78% of patients had exudative pleural effusion and 22% had transudative pleural effusion.Out of 85 cases of exudative etiology most common cause was tuberculous pleural effusion which was 64(75.29%). This is consistent with studies by **Kumar A et al.**[20]and **Suresh Raghavan et al.**[21]where tuberculosis was the commonest cause of exudative pleural effusion. Out of 15 cases of transudative etiology most common cause of transudative pleural effusion was decompensated liver disesase 5(33.33%). But in a study by **Ibrahim et al.**[19]they found that congestive cardiac failure is the most common cause of transudative pleural effusion which is contradictory to our study.ADA plays an important role in diagnosis of pleural effusion. Majority of patients having tuberculous pleural effusion had ADA values of greater than 30. 61(95.31%) patients out of 64 were having ADA values suggestive of tuberculous pleural effusion. **Mathew blakiston et al.**[22]in their study concluded that the median pfADA level was significantly higher in TB pleural effusion (58.1 U/liter) than in non-TB pleural effusions (11.4 U/liter). This is in accordance with our study.It was seen that right sided pleural effusions were more common in the present study which is consistent with the findings of **Mohd Arif Siddiqui et al.**[23]where they also found that right sided pleural effusions were more common.

5. Conclusion

Pleural effusion is the most common pleural disease affecting a significant bulk of population in India. It can be a result of pleural, lung parenchymal and systemic disease. The pleural effusion may be benign or malignant. The present study concludes that breathlessness was the commonest symptom both in patients less than sixty years and elderly. The most common cause of exudative pleural effusion was tuberculous pleural effusion. Despite the revised national tuberculosis control programme in India, the tubercular effusions are still at large. The malignant pleural effusion cases are far less than tuberculosis but their incidence is rising as compared to previous studies. The common causes of transudative pleural effusion in elderly were congestive cardiac failure, decompensated liver disease, uremia, hypothyroidism. Decompensated liver disease was the most common cause of transudative pleural effusion in patients less than 60 years.

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