

## Study of etiology of pleural effusion in the district hospital, Shimoga

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### Abstract

**Introduction:** Pleural effusion is an indicator of a pathologic process that may be of primary pulmonary origin or of some other systemic disease. Determining the etiological of PE helps in adoption of regionally optimized diagnosis & therapeutic approach.

**Materials and Method:** Study is conducted on 100 consecutive patients admitted in various medical wards of the Mc Gann Hospital attached to Shimoga Institute of Medical Sciences, Shimoga. From June 1st, 2016 to January 30th 2017 detailed history was taken in all the patients and a through physical examination was done. Routine investigations were done for all patients. Chest X-ray PA view taken. All the patients were subjected to diagnostic thoracentesis. Under aseptic precautions about 20 ml of fluid was aspirated and subjected to analysis pleural fluid cell count, cell type, sugar, protein and AFB stain done.

**Results:** There were 60 males and 40 females. The mean age was 36±2.2 years. Fever and cough were the most common clinical features seen in 64% and 76% respectively, followed by chest pain (44%) and breathlessness (42%). Tuberculous pleural effusion (64%) was more common than non tuberculous (36%) pleural effusion. Among non tuberculous pleural effusion synpneumonic and malignant effusion were common. Tuberculosis has predominant lymphocytic pleural effusion with cell count less than 200.

**Conclusions:** Aetiological evaluation of pleural effusion is very important for management of the disease. This is important because management is different for different cases. Pleural fluid analysis can be considered as gold standard in evaluation of pleural effusion.

**Keywords:** Cell Cytology; Pleural Effusion; Thoracentesis; Tuberculosis

### Introduction

Accumulation of excess fluid in pleural cavity is due to various disease processes. Pleural effusion is an indicator of a pathologic process that may be of primary pulmonary origin or of some other systemic disease. A variety of diseases are associated with pleural effusion which make diagnosis of pleural effusion problematic. The occurrence of pleural effusion [PE] is a common finding, with higher incidence of effusions secondary to non-infective pathology in the western studies and infective pathology in India [1].

A thoracentesis should be performed in all patients with a pleural effusion of unknown cause, Diagnosing the etiology of pleural effusions clinically with certainty is a challenging task for physicians. The advancements in the field of medicine and with the advent of various diagnostic aids diagnosing pulmonary and pleural disorder are made easy however pleural fluid analysis is still a well established and economical tool in evaluation, determining the etiological of PE helps in adoption of regionally optimized diagnosis & therapeutic approach [2]. Here we have analyzed 50 cases of pleural effusion by collecting relevant clinical & laboratory data in our institute.

### Materials and Method

Study is conducted on 100 consecutive patients admitted in various medical wards of the Mc Gann Hospital attached to Shimoga Institute of Medical Sciences, Shimoga. From June 1<sup>st</sup>, 2016 to January 30<sup>th</sup> 2017.

**Inclusion criteria:** Adult patient aged between 15 to 70 years in whom pleural tapping will yield 20 ml of pleural fluid.

**Exclusion criteria:** Age less than 15 years, pleural aspiration does not yield minimum 20 ml fluid. Critically ill patients.

100 consecutive patients admitted in various medical wards of the Mc Gann Hospital attached to Shimoga institute of medical sciences, Shimoga with pleural effusion fulfilling the inclusion and exclusion criteria were taken into study after obtaining written informed consent. In all these patients, detailed clinical history and detailed clinical examination was carried out and routine investigations were done for all patients. Chest X-ray (PA) view taken. All the patients were subjected to Diagnostic Thoracentesis. Under aseptic precautions about 20 ml of fluid was aspirated and subjected to pleural fluid analysis –biochemical, microbiological, pathological analyses were done. Pleural fluid cell count, cell type, sugar, protein and AFB stain and sputum AFB were done for all patients. Pleural fluid gram staining and culture were carried out in necessary patients. Other Investigations like Echocardiography, ultrasonogram abdomen were done in relevant cases only. All the patients were evaluated thoroughly and an appropriate etiological diagnosis was made.

### Results

**Demographic Data:** 100 consecutive patients with pleural effusions were studied from June 1<sup>st</sup>, 2016 to

January 30<sup>th</sup> 2017. There were 60 males and 40 females.

The mean age was  $36 \pm 2.2$  years. The mean age among men was  $33.22 \pm 6.72$  years and in women was  $34.45 \pm 7.11$  years. Majority of the patients were in the age group of 30-40 years (Table 1). The male to female ratio was 1.2:1.

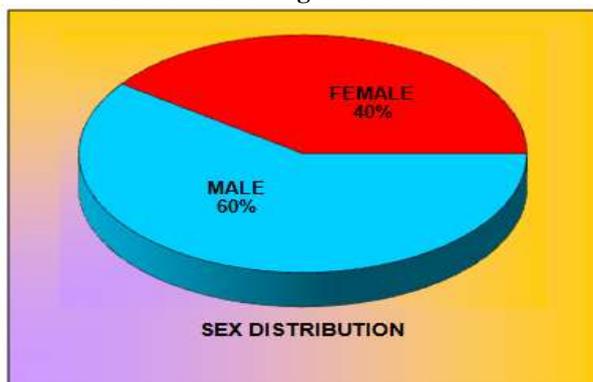
**Pleural fluid glucose:** 100% of parapneumonic effusion, 95% of Tubercular effusion had pleural fluid glucose between than 40-60 mg/dl.

**Table 1: showing Sex distribution**

Sex	No. of patients	Percentage
Male	60	60
Female	40	40

The male to female ratio was 1.2:1.

**Chart 1: Showing sex distribution**

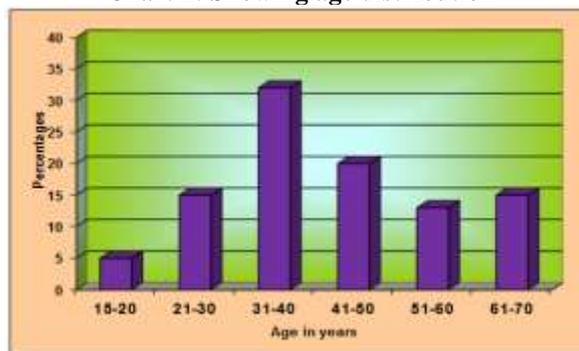


**Table 2: Showing age distribution**

Age group	No. of patients	Percentage
15-20	5	5
21-30	15	15
31-40	32	32
41-50	20	20
51-60	13	13
61-70	15	15

Average age is  $36 \pm 2.2$  years. The majority of these patients belong to the age group of 30-40 years. The highest number of cases (32%) was from the age group of 30 to 40 years

**Chart 2: Showing age distribution**



**Table 3: Showing clinical presentations**

Clinical features	No. of patients	Percentage
Fever	64	64
Cough	76	76
Breathlessness	42	42
Pedal edema	21	21
Chest pain	44	44

Fever and cough are the most common clinical features seen 64 and 76 percentage respectively, followed by chest pain (44%) and breathlessness (42%).

**Table 4: Types of pleural effusion**

Diagnosis	No. of patients	Percentage
Tuberculous pleural effusion	64	64
Non tuberculous pleural effusion	36	36

Tuberculous pleural effusion is common than non tuberculous pleural effusion.

**Table 5: Types of non-tuberculous pleural effusion**

Non tuberculous pleural effusion	No. of patients	Percentage
Synpneumonic	42	42
CCF	12	12
Malignant	32	32
Hypoproteinemia	8	8
Dengue fever	2	2
Pancreatitis	2	2
Rheumatoid arthritis	2	2

Among non tuberculous pleural effusion synpneumonic and malignant effusion were common. Few cases of pancreatitis, dengue fever Rheumatoid arthritis were also found.

**Table 6: Pleural fluid cytology in various types of pleural effusion**

	Total cell count in mm <sup>3</sup>			Neutrophils	Lymphocytes	Gram Stain	AFB
	0-200	200-500	>500				
Tuberculous (64)	30	28	6	2	62	0	2
Synpneumonic (15)	2	4	9	15	0	1	0
CCF(4)	4	0	0	0	4	0	0
Malignant (11)	10	1	0	4	7	Malignant cells	0
Hypoproteinemia (3)	3	0	0	0	3	0	0
Dengue fever (1)	1	0	0	0	1	0	0
Pancreatitis (1)	1	0	0	1	0	0	0
Rheumatoid arthritis (1)	1	0	0	0	1	0	0

Tuberculosis has predominant lymphocytic pleural effusion with cell count less than 200. In synpneumonic effusion cell count is more than 500 in majority of cases.

### Discussion

Study is conducted on 100 consecutive patients. There were 60 males (60%) and 40 females (40%) in the present study. The male to female ratio was 1.5:1. This findings is consistent with that of Luis Valdes- 62.5% males and 37.5% females with a ratio of 1.6:1 and in study by Reddy et al. it is 78% males and 22% females with a ratio of 3.54:1 [2,3].

The age distribution of these patients ranged from 15 years to 70 years with maximum number of patients in the age group 31 to 40 years. There were 32% of patients in this age group. Average age is 36±2.2 years. The mean age in case of tuberculous effusion was 32.5± 5.5 years consistent with Valdes et al. [3] (34 years) and Sharma et al. [4] (33 years), Reddy et al. [2], 41 years and Subhakar et al. [5] (31 years).

Patients in our study with malignant pleural effusion were older, around 62 years compared to -study done by Reddy et al. [2], 60 years and many western studies were it was around 65 years [2] studies done by many Indian authors show younger age groups such as study done by Sharma et al. [4] (mean age 47 years) and Subhakar et al. [5] (mean age 51 years).

The mean age in case of transudative effusions was 45±3.8 years in comparison to Subhakar et al. [5] (48.15±6.92). The mean ages in case of parapneumonic and empyema were 42±6.2 years, 44.4±3.3 years respectively in our study.

**Table 7: Showing symptoms, as reported by various authors (in percentage)**

Symptoms	Reddy et al. [2]	Gopi et al. [6]	Godwin et al. [7]	Kaushal et al. [8]	Present study
No. of patients	100	Analysis from many studies	199	50	100
Fever	70	-	60.3	72	64
Cough	73.3	70	78.4	66	76
Breathlessness	66.7	-	65.3	62	42
Pedal edema	0	-	-	-	21
Chest pain	35	75	71.4	80	44

The findings of the present study are comparable with that of above studies.

**Table 8: Tubercular and non tubercular pleural effusion**

Diagnosis in Percentage	Present study	Kaushal et al. [8]	Reddy et al. [2]	Parikh et al. [9]
Tuberculous pleural effusion	64	66	60	66
Non tuberculous pleural effusion	36	34	40	34

Tubercular etiology is common than other causes and is comparable to other Indian studies

**Table 9: Etiology and incidence of various pleural effusions**

Diagnosis in Percentage	Present study	Kaushal et al. [8]	Godwin et al. [7]	Reddy et al. [2]
Tuberculous pleural effusion	64	66	42	66
Synpneumonic	15	10	14	12
CCF	4	2	14	8
Malignant	11	18	12	8
Hypoproteinemia	3	4	4	-
Dengue fever	1	-	-	-
Pancreatitis	1	-	-	-
Rheumatoid arthritis	1	-	2	-

Tubercular cause is followed pneumonia, CCF and malignancy and is comparable to other Indian and African studies.

**Table 10: Cell cytology in our study and other reference studies**

Study	Predominant cells	Etiology of effusion
Our study	Lymphocytes	96% of TB effusion 63% of malignant effusion
Kaushal et al. [8]	Lymphocytes	97% of TB effusion 77% of malignant effusion

Predominant lymphocytosis is seen in tuberculosis and malignancy in our study and is comparable to study done by Kaushal et al. [8].

Most Common cause of pleural effusion was tuberculosis followed by parapneumonic and malignancy. Tuberculous effusion was more common in younger age group (below 45 years) while malignant effusion was more common in older age group (above 60 years). Right sided pleural effusion was more common in tuberculosis, malignant, CCF and synpneumonic effusion while bilateral pleural effusion was more common in patients with CCF and Hypoproteinemia. Majority of the patients with malignant pleural effusion had large effusion, while tuberculous pleural effusion had a moderate effusion. Majority of the patients with tuberculous pleural had yellowish and turbid fluid, while malignant pleural effusion had hemorrhagic fluid. Pleural fluid cytology was positive for malignant cells in most of the cases.

### Conclusions

Etiological evaluation of pleural effusion is very important for management of the disease. This is done by clinical examination and analysis of the pleural fluid for cytology, bacteriology and biochemical parameters like protein, glucose. This is important because management is different for different cases. Pleural fluid analysis will also help in knowing the need for further evaluation of the case such as pleural biopsy or

CT thorax. Pleural fluid analysis can be considered as gold standard in evaluation of pleural effusion.

**Conflict of interest:** None declared

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