|| ISSN(online): 2589-8698 || ISSN(print): 2589-868X ||
International Journal of Medical and Biomedical Studies
Available Online at www.ijmbs.info
PubMed (National Library of Medicine ID: 101738825)
*Index Copernicus Value 2018: 75.71*
Original Research Article
Volume 3, Issue 5; May: 2019; Page No. 125-128

# CORRELATING BIOCHEMICAL, RADIOLOGICAL AND CYTOLOGICAL OUTCOMES OF PLEURAL EFFUSION

**[1]Dr. Shefali Mehta, [2]Dr. Shuchi Goyal, [3]Dr. Rajendra Triloki, [4]Dr. Renu Meena**

[1]Assistant Professor, [2]Professor and Head, *[3]Final year Resident, [4]Senior Demonstrator,*

*Department of Biochemistry, Rabindranath Tagore Medical College, Udaipur, Rajasthan*

**Article Info:** Received 22 April 2019; Accepted 20 May. 2019
**DOI: https://doi.org/10.32553/ijmbs.v3i5.233**
**Corresponding Author:** Dr. Shuchi Goyal, Professor and Head, Department of Biochemistry, Rabindranath Tagore Medical College, Udaipur, Rajasthan
**Conflict of interest:** No conflict of interest.

**Abstract:**

Introduction: The research emphasises on the association bond of correlation of biochemical radiological and cytological outcomes of pleural effusion

Material and Methods: The samples for the study were collected from the diagnostic centre, out-patient department and in-patient department of *Department of Biochemistry, Internal* Medicine, Respiratory Medicine at *Rabindranath Tagore Medical College, Udaipur, Rajasthan* The research was carried out on a total of 100 patients .The observations took about a year's time. The research was carried out on a total of 100 patients,

Results: 100 patients with pleural effusion were studied of which 60.00% were cases of tuberculous effusion and 40.00% were cases of non tuberculous effusion. This was reflective of the high prevalence of tuberculosis in the area being studied. The remaining 40 cases were of malignant effusion (15 cases), Transudative effusion (13 cases), synpneumonic effusion (8 cases) and 4 cases of empyema. In patients of age more than 40 years, malignant effusion was more common; It was found more common in lower socioeconomic class such people live in crowded, unhygienic conditions. The commonest symptoms were cough (81.32%) and breathlessness (78.76%), followed by fever 69.20%, weight loss 64.64%, chest pain 45.50%, loss of appetite 63.30% and hemoptysis 15.80%.

Conclusion: Thus it can be concluded that ADA is elevated in tubercular pleural effusion. Exudatives had decreased glucose but increased protein, LDH and cholesterol compared to transudatives Pleural fluid cytology revealed elevated Lymphocytes in tubercular and polymorphs in acute infections

***Keywords:*** Lactate dehydrogenase, Adenosine Deaminase biochemical, radiological and cytological outcomes of pleural effusion

## Introduction

Pleural effusion refers to the excessive or abnormal accumulation of fluid in the pleural space. Pleural effusion presents a diagnostic dilemma, as no cause may be found in about 19% of cases, in spite of careful evaluation[2]. It is important to establish an accurate etiological diagnosis, so that the patient may be treated in the most appropriate and rational manner.

India has the highest prevalence of tuberculosis in the world with 2/3rds of all TB patients being in India[3]. Tuberculosis is the most common cause of effusion in India when compared to the West where malignancy and parapneumonic effusions are more common[4]. Pleural tuberculosis is second in frequency after TB lymphadenitis. The clinical, biochemical and cytological parameters of tubercular effusion are shared by malignancy, both being exudates and predominantly lymphocytic effusions. There is hence a need for defining the best and on-time diagnostic approach to diagnose transudative and exudative pleural effusion quickly.

Exudative Effusion should meet at least one of the following criteria

- Pleural fluid protein to serum protein ratio greater than 0.5

- Pleural fluid LDH to serum LDH ratio greater than 0.6
- Pleural fluid LDH greater than two-thirds of the upper limit of normal for the serum LDH
- To evaluate pleural glucose, total protein, Lactate dehydrogenase, Adenosine Deaminase and cholesterol in the diagnosis of pleural effusion
- To evaluate the cytological profile of pleural effusion
- To evaluate the radiological profile of pleural effusion

**Materials and Methods**

Study Design

It was a case-control study in patients presenting with clinical features of pleural effusion and confirmed by using chest X-rays, USG of the thorax and pleural fluid analysis. The pleural fluid will be analysed for cell count, cell type, specific gravity, protein sugar content, the presence of acid-fast bacilli, malignant cells, LDH, ADA and Cholesterol levels. The serum LDH, protein and cholesterol will be estimated.

*Inclusion Criteria*

An adult patient with pleural effusion as determined by clinical and or radiological means, thoracocentesis on who yield a minimum amount of fluid enough to carry out routine test will be included in the study.

*Exclusion Criteria*

Patients with pleural effusion with non-aspirable fluid quantity decided clinically or radiologically, will be excluded.

**Table 1:**

| Sr. No. | Type of Effusion | No. of Cases | Percentage (%) |
|---|---|---|---|
| 1 | Tuberculous | 60 | 60 |
| 2 | Malignant | 15 | 15 |
| 3 | Transudative | 13 | 13 |
| 4 | Synpneumonic | 8 | 8 |
| 5 | Empyema | 4 | 4 |

The most common cause of exudative effusion in this study were tuberculosis (60), followed by malignancy (15), Transudative (13), Syn-pneumonic (8) and empyema (4).
Among the 100 cases of pleural effusion there were 71 males and 29 females. The male: Female ratios in the various groups are as follows

**Table 2:**

| | | No. of Cases | |
|---|---|---|---|
| Sr. No. | Type of Effusion | Male | Female |
| 1 | Tuberculous | 42 | 18 |
| 2 | Malignant | 11 | 4 |
| 3 | Transudative | 9 | 4 |
| 4 | Synpneumonic | 6 | 2 |
| 5 | Empyema | 3 | 1 |

Site of Effusion
Out of the 100 cases of pleural effusion 62 cases were right sided and 32 cases were left sided, 6 patients had bilateral effusions.

**Table 3:**

| Sr. No. | Type of Effusion | Left | Right | Bilateral |
|---|---|---|---|---|
| 1 | Tuberculous | 24 | 36 | 0 |
| 2 | Malignant | 6 | 7 | 2 |
| 3 | Transudative | 0 | 9 | 4 |
| 4 | Synpneumonic | 2 | 6 | 0 |
| 5 | Empyema | 0 | 4 | 0 |

Majority had moderate amount of pleural effusions. Blood count and ESR were significantly elevated in exudatives.

Pleural Fluid Cytology

**Table 4:**

| Sr. No. | Type of Effusion | No. of Cases | Call Count | Celltype Predominant | Malignant Cells |
|---|---|---|---|---|---|
| 1 | Tuberculous | 60 | 1059±503 | Lymphocytes | |
| 2 | Malignant | 15 | 1020±279 | Lymphocytes | Positive in 11 cases |
| 3 | Transudative | 13 | 161±63 | Monocytes and lymphocytes | |
| 4 | Synpneumonic | 8 | 4519±1589 | Polymorphocytes | |
| 5 | Empyema | 4 | 5929±269 | Polymorphocytes | |

Pleural fluid cytology revealed elevated Lymphocytes in tubercular and polymorphs in acute infections. Cytology for malignant cells was diagnostic in 11 cases.

**Table 5:**

| | | | Pleural Fluid | | | | |
|---|---|---|---|---|---|---|---|
| S. No. | Type of Effusion | No. of Cases | GLU (mg/%) | PROT (gm/%) | LDH (U/L) | ADA (IU/L) | CHOL (mg/%) |
| 1 | Tuberculous | 60 | 62±8.1 | 4.4±1.6 | 234.3±41 | 78.9±20.1 | 72.6±9.1 |
| 2 | Malignant | 15 | 54±4 | 4.8±0.5 | 339±44.5 | 43.2±9.6 | 75.9±9.9 |
| 3 | Transudative | 13 | 79±11 | 2.1±0.9 | 97±25.6 | 27.9±7.9 | 37.1±5.4 |
| 4 | Synpneumonic | 8 | 45±15 | 4.6±0.6 | 532±90 | 42.3±20.9 | 73.9±4.1 |
| 5 | Empyema | 4 | 31±5 | 4.6±0.5 | 1125±245 | 31±6.1 | 73.8±4.4 |

ADA was significantly elevated in tubercular pleural effusion. Exudatives had decreased glucose but increased protein, LDH and cholesterol compared to transudatives.

**Discussion**

100 patients with pleural effusion were studied of which 60.00% were cases of tuberculous effusion and 40.00% were cases of non tuberculous effusion. These results were expected as in a country like India, there is a high prevalence of tuberculosis. Out of the 100 cases of pleural effusion, which were studied, 60 cases were of tuberculous effusion. This was reflective of the high prevalence of tuberculosis in the area being studied. The remaining 40 cases were of malignant effusion (15 cases), Transudative effusion (13 cases), synpneumonic effusion (8 cases) and 4 cases of empyema. In study by Prabhu Desai, tubercular effusion comprises 64% of infective cause and 8% were of empyema. In patients of age more than 40 years, malignant effusion was more common; A1 quatrain - common diagnose was tubercular (37%) followed by neoplasm (8%), parapneumonic (14%) and congestive cardiac failure (14%); KZ Mamum - also showed tubercular and malignancy were the major causes of pleural effusion. Valdes showed tubercular and transudative were commonest causes. It was found more common in lower socioeconomic class such people live in crowded, unhygienic conditions. The commonest symptoms were cough (81.32%) and breathlessness (78.76%), followed by fever 69.20%, weight loss 64.64%, chest pain 45.50%, loss of appetite 63.30% and hemoptysis 15.80%.

Most of the patients with synpneumonic effusion, had complaints of a short duration with an acute onset, whereas those with tuberculous effusion and malignancy had complaints of a longer duration. This is in line with the study by Follader who found that the main complaints were fever (41/44), chest pain (41/44) and weight loss (34/44). Out of the 100 patients with pleural effusion 62 patients had a right sided effusion and 32 patients had a left sided effusion and 6 patients had bilateral effusion. Earlier study of A1 Quarain showed pleural effusion was more common in right side (55%) than on the left (32%); whereas Follander concluded that both right and left side effusion were of equal distribution.

All tubercular pleural effusion patients were put on treatment with antitubercular drugs along with steroids for rapid absorption of fluid and prevent fibrosis. Malignant pleural cases had pleurodesis and Synpneumonic effusion responded to appropriate

antibiotics given for 2 weeks. Empyema patients required intercostals drainage and antibiotics were given for 3 weeks. All patients received other supportive measures. Check x-ray were done when and where necessary.

## Conclusion

Thus it can be concluded that ADA is elevated in tubercular pleural effusion. Exudatives had decreased glucose but increased protein, LDH and cholesterol compared to transudatives Pleural fluid cytology revealed elevated Lymphocytes in tubercular and polymorphs in acute infections. The study suggests that pleural glucose, total protein, Lactate dehydrogenase, Adenosine Deaminase and cholesterol are valuable tools for a rapid assessment and diagnosis of pleural effusion

## References


1. Light RW. Pleural diseases. 6th ed.Philadelphia: Lippincott Williams & Wilkins; 2013
2. Storey DD, Dines DE, Coles DT. Pleural effusion. A diagnostic dilemma. JAMA. 1976 Nov 8;236(19):2183-6
3. Park. Text book of preventive and social medicine. In: Epidemiology of Tuberculosis. 18th edn., Bansarilal Publications 2005.
4. Maldhure, Kulkarni B. Pleural biopsy and adenosine deaminase in the pleural fluid in the diagnosis of tubercular pleural effusion. Ind J Tuberculosis 1994;41:161-164.
5. Sahn SA. The pleura. Am Rev Resp Diseases 1988;138:184-234.
6. Romero S, Candela A, Martin C, et al. Evaluation of different criteria for the separation of pleural transudates from exudates. Chest 1993;104:399-404.
7. Burgess LJ, Maritz FJ, Taljaard JJ. Comparative analysis of the biochemical parameters used to distinguish between pleural transudates and exudates. Chest 1995; 107:1604-1609.
8. Mistry, M. A comparative study and evaluation of the diagnostic utility of ADA pleural, peritoneal and cerebrospinal fluid for the diagnosis of TB, International J of Innovative Research and Development, 2012; 1(5):213-222.
9. Biswas, B et al. Pleural effusion: Role of pleural fluid cytology, adenosine deaminase level, and pleural biopsy in diagnosis, J Cytol, 2016; 33(3):159-162.
10. Khamar, ND et al. A clinical study of pleural effusion and its radiological, biochemical, bacteriological and cytological correlation, J of Integrated Health Sciences, 2017; 5(1):8-12.
11. Rao, RRM et al. Aetiological Study of Pleural Effusion By Conventional Methods-Its Clinical Presentation Along With Radiological, Biochemical And Cytological Correlation Of 60 Cases Of Pleural Effusion, J. Evolution Med. Dent. Sci. 2016; 5(52):3420-3424.
12. Ahmed SE et al. Role of ultrasonography in the diagnosis of pleural effusion, Egyptian J of Bronchology, 2017; 11:120-127.
13. Aruna, V. et al. A Study of Clinical & Etiological Profile of Exudative Pleural Effusion, - Indian Journal of Research, 2018; 7(6):24-29.
14. Parikh, P. et al. Study of 100 cases of pleural effusion with reference to diagnostic approach, Int J Adv Med. 2016; 3(2):328-331.