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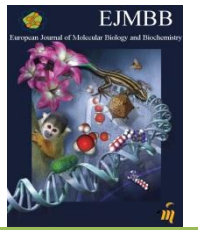

A STUDY ON MEASUREMENT OF SERUM AND PLEURAL FLUID TOTAL PROTEIN, ALBUMIN, LDH AND PROTEIN THIOLS IN PATIENT WITH PLEURAL EFFUSION

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ABSTRACT

For the past several decades, transudates have been differentiated from exudates, according to Light's criteria, by measurement of levels of protein and LDH in the serum and the pleural fluid. But the problem of "pseudoexudate', that is elevated protein content of an effusion with diuretic use in patients of congestive heart failure later confirmed by Romero et al leads to the proposal of serum effusion albumin gradient. A total of 56 patients of pleural effusion were taken with diverse etiology, then venous blood sample and pleural fluid were collected from these patients after diagnosing clinically, radiologically and after thoracocentesis. The study included 56 clinically diagnosed patients with pleural effusion of diverse etiology, who were divided into 2 groups based on etiology and clinical diagnosis .Group I (exudates): comprising 30 cases of tuberculous (n=21), malignant (n=7), Empyema (n=2) and Group II (transudates): Comprising 26 patients of congestive heart failure (n=l4) anemia (n=5), and Cirrhosis (n=7).

INTRODUCTION

For many years, a pleural fluid protein level of 3.0 g/dl was used to separate transudates from exudates, with exudative pleural effusions characterized by a protein level above 3.0 g/dl .29,30 Use of this one simple test led to the misclassification of approximately 10% of pleural effusions [1].Light et al subsequently demonstrated that with the use of simultaneously obtained serum and pleural fluid protein and lactic acid dehydrogenase (LDH) values, 99% of pleural effusions could be correctly classified as either transudates or exudates [1].

Light's criteria [1]

- Pleural fluid protein divided by serum protein greater than 0.5
- Pleural fluid LDH divided by serum LDH greater than.0.6
- Pleural fluid LDH greater than two thirds of the upper limit of normal serum LDH

Exudative pleural effusions meet at least one of the above criteria, whereas transudative pleural effusions meet none (Light's criteria)

For the past several decades, transudates have been differentiated from exudates, according to Light's criteria, by measurement of levels of protein and LDH in the serum and the pleural fluid. But the problem of "pseudoexudate' [2,3]that is elevated protein content of an effusion with diuretic use in patients of congestive heart failure later confirmed by Romero et al11 leads to the proposal of serum effusion albumin gradient[4].

Later Light reviewed that if the patient's pleural fluid meets exudative criteria, but the patient appears clinically to have a transudative effusion, then the serum-pleural fluid albumin gradient should be measured. If this is greater than 1.2 gd/l, the patient probably does have a transudative effusion [5].In the past, transudates were separated from exudates by the specific gravity of 1.015

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corresponds to a protein content of 3 g/dl31 but the pleural fluid specific gravity measurement is extraneous and confusing, it should no longer be ordered. In the past, transudates were separated from exudates by the cell count, and the presence or absence of clotting of the fluid.39 It might be presumed that any pleural fluidt hat appears bloody would be an exudate, although some exudates might be serous. Paddock found that 12%of transudates had red blood cell counts greater than 10, 000/cumm. The pleural fluid white blood cell (WBC) count of most transudates is less than 1,000/cumm, but approximately 20% have WBC counts that exceed 1,000/cumm [6,7]

METHODOLOGY

The study was conducted on 56 male/female patients who were diagnosed as pleural effusion clinically, radiologically and thoracocentesis was done already by physician in Teaching and General Hospital.

A total of 56 patients of pleural effusion were taken with diverse etiology, and then venous blood sample and pleural fluid were collected from these patients after diagnosing clinically, radiologically and after thoracocentesis.

INCLUSION CRITERIA:

Cases clinically diagnosed as having pleural effusion with diverse etiology

EXCLUSION CRITERIA:

Cases with either no cause were definitely diagnosed or more than one cause present will be excluded from the study.

Data was collected on standard Proforma, detailing the medical history, physical examination and investigation.

Parameters Studied:

1. Serum Albumin
2. Serum Total Proteins
3. Serum Lactate dehydrogenase
4. Serum protein thiols
5. Pleural Fluid Albumin
6. Pleural Fluid Total Protein
7. Pleural Fluid Lactate dehydrogenase
8. Pleural Fluid Protein thiols

RESULTS

The study included 56 clinically diagnosed patients with pleural effusion of diverse etiology, who were divided into 2 groups based on etiology and clinical diagnosis .Group I (exudates): comprising 30 cases of tuberculous (n=21), malignant (n=7), Empyema (n=2)and. Group II (transudates): Comprising 26 patients of congestive heart failure (n=l4) anemia(n=5),and Cirrhosis (n=7). All patients were differentiated based on light's criteria into exudates and transudates. In a previous study, a cut off value of 1.2 g/dl was taken for serum effusion albumin gradient to differentiate between exudate and transudate. A serum-effusion albumin gradient of >1.2 g/dl was interpreted as transudate while a gradient 1 .2 g/dl was interpreted as exudates.

Table 1. Age Distribution

Age	Transudates	Exudates
21-30	7	2
31-40	6	3
41-50	5	6
51-60	5	5
61-70	4	4
71-80	3	6

Youngest of the group: 22
Oldest of the group: 80

Table 2. Comparison of serum (total protein, albumin, LDH, thiols) between transudate and exudates

Biochemical parameter	Exudates	Transudate	Significance
Total protein	5.4 ± 0.88	6.1 ± 0.76	p < 0.001
Albumin	3.08	± 0.44	3.82
LDH	532.9	± 193.9	310.6
Protein thiols	66.2	± 19.4	116.8 ± 27.7

Table 3. Comparison of pleural fluid ((total protein, albumin, LDH, thiols) between transudate and exudates

Biochemical parameter	Exudate	Transudate	Significance
Total protein	5.04	± 1.38	3.07
Albumin	2.56	± 0.52	2.00
LDH	473.5	± 248.7	123.6
Protein thiols	51.39 ± 22.3	151.1 ± 15.0	p < 0.001

DISCUSSION

In abnormal states pleural fluid can be accumulated for a number of reasons. Generally it is due to increased fluid formation or decreased fluid absorption. It is accepted that an effusion due to pleural disease more closely resembles plasma (exudates) while that occurring in the presence of a normal pleural membrane is due to hemodynamic aberrations or oncotic changes and is an ultra filtrate of plasma (transudate). Transudate effusions resulting from different causes occur in association with an intact microvasculature, thus maintaining the grading between serum and pleural fluid protein [4]**.** Etiologies for the production of exudates involve some type of inflammation that results in a compromised pulmonary or pleural microvasculature which in turn leads to increased fluid leaking, a higher protein concentration and decrease in albumin gradient [8]**.** The initial step in determining the cause of a pleural effusion is to categorize effusion as transudate or exudate. The classic criterion given for differentiation of exudates from transudates was provided by light et al [9]. However several reports have shown that this criteria misclassified a large number of effusions, especially transudates [4- 6] . Thereafter a number of alternate parameters have been proposed to improve the results of the classic criteria.

1. Pleural fluid cholesterol.
2. Pleural fluid to serum cholesterol ratio.
3. Pleural fluid to serum bilirubin ratio.
4. Pleural fluid to serum cholinesterase ratio was suggested, but no parameters have yet been proved to be satisfactory.

Recently usefulness of Malondialdehyde (MDA) has been studied to differentiate transudates from exudates 60 and was found to have increased levels of MDA in pleural fluid in exudates compared to transudates indicating increased oxidative stress in exudates compared to transudates 61. Albumin, a major plasma protein which maintains the oncotic pressure, is also an important extra cellular antioxidant. Albumin contains an exposed cysteine –SH (thiol) group and provide the bulk of total plasma thiol, a well-known antioxidant.

CONCLUSION

The present study shows that measurement of serum & pleural fluid protein thiols in patients with pleural effusion of diverse etiology proved to be better marker for the differentiation of exudates and transudates, as this method provided a high sensitivity and specificity for characterization of effusion as an exudates and transudates compared to light's criteria. This explains the different pathophysiology behind the production of exudates and transudates.

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