

# Original Article

## Assessment of type and cause of pleural effusion among 50 patients

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### ABSTRACT:

**Background:** Clinical evaluation of a patient with pleural effusion relies heavily upon the examination of the fluid which is obtained by thoracentesis. The present study was conducted to assess type and cause of pleural effusion. **Materials & Methods:** 50 patients with pleural effusion of both genders were enrolled. The pleural effusions were categorized as exudative and transudative according to the causative etiology. The sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and accuracy of each parameter was performed. **Results:** Out of 50 patients, males were 30 and females were 20. Out of 50 patients, exudate was seen in 32 and transudate in 18. The cause found to be tuberculosis in 20, para pneumonic in 8 and malignancy in 4 cases and in transudate, the cause was heart failure in 12 and liver cirrhosis in 6 cases. The accuracy of LDH ratio was 89%, protein ratio was 93%, fluid cholesterol was 96% and bilirubin ratio was 89%. **Conclusion:** Type of pleural effusion was exudate and transudate. The cause found to be tuberculosis, para pneumonic and malignancy in exudate and in transudate, the cause was heart failure and liver cirrhosis.

**Key words:** Pleural effusion, exudate, transudate

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### INTRODUCTION:

The internal surfaces of the thoracic cavity are covered by pleura, includes a cover of mesothelial cells held up by a net of connective plus fibro elastic tissue.<sup>1</sup> Usually, a small amount of fluid within the pleural space works like a lubricant to decrease friction amid chest wall and lung at inspiration and expiration. This fluctuation of fluid is based on the oncotic in addition to hydrostatic pressures within the parietal plus visceral pleura as well as the pressure inside the pleural space its own.<sup>2</sup> Fluid is drained out mostly through lymphatics within the parietal pleura. Transudative pleural effusions derive from general illnesses that may not directly affect the pleura but alternatively provide an asymmetry of Starling's forces, ending in moving of fluid within the pleural space.<sup>3</sup>

Clinical evaluation of a patient with pleural effusion relies heavily upon the examination of the fluid which is obtained by thoracentesis. Defining the exact aetiology is difficult and is not always possible.<sup>4</sup> The pleural effusion is most conveniently separated into transudate (ultra filtrates of plasma resulting from increased hydrostatic pressure or profoundly decreased serum oncotic pressure) and exudate (protein-rich effusions resulting from increased capillary permeability depending upon their characteristics).<sup>5</sup>

Intrapleural illness can be suggested by the presence of exudative effusion. In order to differentiate

exudative from transudative pleural effusion, Light et al established a criteria to do so with sensitivity 99% and specificity 98% that include pleural protein/serum protein of >0.5, pleural LDH/serum LDH of >0.6 and an estimated level of LDH in the pleural fluid more than two thirds LDH serum level.<sup>6</sup> The present study was conducted to assess type and cause of pleural effusion.

### MATERIALS & METHODS:

The present study was conducted among 50 patients with pleural effusion of both genders. All were informed regarding the study and their consent was obtained.

Data such as name, age, gender etc. was recorded. A thorough history and physical examination was performed. Diagnostic pleural fluid tapping was done. The samples then were examined for glucose, white blood cell count, LDH, cholesterol, bilirubin, protein, acid fast stain, Gram stain, bacterial culture, and cytology. The pleural effusions were categorized as exudative and transudative according to the causative etiology, the Light's criteria, pleural bilirubin/serum bilirubin > 0.6 mg/dL and cholesterol in pleural. The sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and accuracy of each parameter was performed. Results were statistically analyzed.

**RESULTS:**

**Table I Distribution of patients**

Total- 50		
Gender	Males	Females
Number	30	20

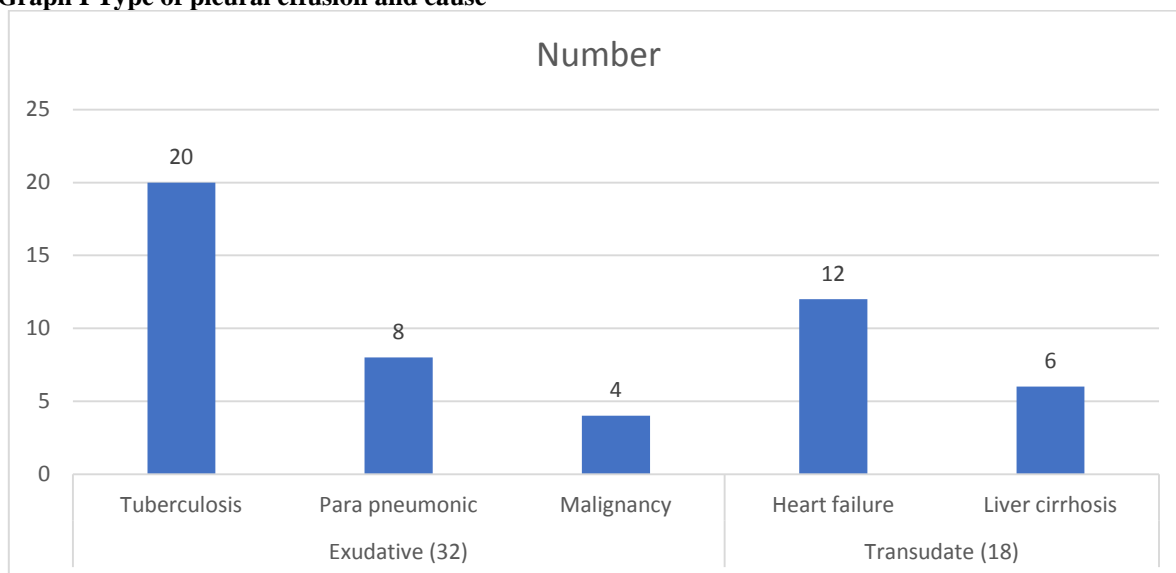
Table I shows that out of 50 patients, males were 30 and females were 20.

**Table II Type of pleural effusion and cause**

Type	Cause	Number	P value
Exudative (32)	Tuberculosis	20	0.01
	Para pneumonic	8	
	Malignancy	4	
Transudate (18)	Heart failure	12	0.02
	Liver cirrhosis	6	

Table II, graph I shows that out of 50 patients, exudate was seen in 32 and transudate in 18. The cause found to be tuberculosis in 20, para pneumonic in 8 and malignancy in 4 cases and in transudate, the cause was heart failure in 12 and liver cirrhosis in 6 cases. The difference was significant ( $P < 0.05$ ).

**Graph I Type of pleural effusion and cause**



**Table III Factors for identifying exudate and transudate**

Parameters	Sensitivity	Specificity	PPV	NPV	Accuracy
LDH ratio	87%	85%	95%	76%	89%
Protein ratio	100%	72%	90%	100%	93%
Fluid cholesterol	93%	100%	100%	88%	96%
Bilirubin ration	87%	86%	95%	76%	89%

Table III shows that accuracy of LDH ratio was 89%, protein ratio was 93%, fluid cholesterol was 96% and bilirubin ratio was 89%.

**DISCUSSION:**

Evaluation of the patient with pleural effusion is challenging, because the differential diagnosis is broad and includes both benign and life-threatening conditions.<sup>7</sup> Moreover, the invasive and non-invasive tests required to make an etiological diagnosis may not be readily available in a primary care setting, and patients may require symptomatic management before the cause of the effusion is identified.<sup>8</sup> Despite the challenges inherent to different settings, an organized approach to diagnosis and treatment is necessary to

orient care adequately.<sup>9</sup> The present study was conducted to assess type and cause of pleural effusion. In present study, out of 50 patients, males were 30 and females were 20. Kale et al<sup>10</sup> evaluated the diagnostic performance of the pleural fluid protein, LDH, cholesterol, bilirubin and their ratio with serum values, as well as the albumin gradient in differentiating the pleural fluid into transudate and exudate. A total of 50 cases of pleural effusion due to different diseases were analysed using certain biochemical parameters like pleural fluid cholesterol, protein and LDH. Their ratio with serum values and

the albumin gradient were also analysed. The pleural fluid protein, its ratio to serum protein and pleural fluid LDH had excellent diagnostic accuracy in differentiating exudative pleural effusions from transudative effusions. Pleural fluid LDH levels were not influenced by serum LDH levels. The optimal threshold for pleural fluid LDH was 175 IU/L.

We found that out of 50 patients, exudate was seen in 32 and transudate in 18. The cause found to be tuberculosis in 20, para pneumonic in 8 and malignancy in 4 cases and in transudate, the cause was heart failure in 12 and liver cirrhosis in 6 cases. Lakhota et al<sup>11</sup> in their study a comparison of various biochemical parameters used in differentiation of nature of pleural effusion in transudate and exudate was done in 84 patient of pleural effusion. Pleural fluid (P) cholesterol and bilirubin which have gained an importance in recent years were compared with pleural fluid protein, LDH, P/S protein, P/S LDH and Light's criteria. It was seen that Light's criteria is still the best in differentiation. Sensitivity of individual test was nearly same for Pl. protein (94.11%), P/S Protein (94.11%), Pl. LDH (95.5%), P/S LDH (92.75%). Pl cholesterol (88.3%) and P/S cholesterol (91.42%) had slightly lower sensitivity. Pl. Protein and P/S LDH had 100% specificity. Lights criteria had 100% specificity and sensitivity % of cases misclassified by various criteria were Pl Protein 5.95%, P/S protein 5.95%, PLDH 4.76%, P/S LDH 4.76% P. Cholesterol 13% and P/S Cholesterol 9.52% Measurement of Bilirubin did not provide any correlation in classifying the effusion and thus did not hold any value.

Gazquez et al<sup>12</sup> compared the accuracy of Light's criteria for categorizing a pleural effusion as an exudate with several alternative criteria. Medical records and pleural fluid characteristics of 241 consecutive patients with pleural effusion admitted over a 29-month period were reviewed. Forty-eight of these patients were excluded for different reasons. Light's criteria and a different cut-off level for the pleural fluid cholesterol level were applied and their accuracies were calculated. Of the 193 patients included, 38 (20%) had transudates and 155 (80%) exudates. The accuracy of Light's criteria for identifying exudates was 92% [confidence intervals (CI), 88-96%], with a sensitivity of 97% (CI, 94-100%) and specificity of 71% (CI, 57-85%). A cut-off level of 50 mg dl-1 was selected for pleural cholesterol, which yielded a sensitivity and specificity of 84% (CI, 79-90%), with an accuracy of 84% (CI,

72-96%). Overall, pleural cholesterol misclassified more exudates as transudates than Light's criteria (15 vs. 3.2%,  $P < 0.001$ ). The combination of pleural cholesterol with lactate dehydrogenase (LDH) or pleural fluid/serum protein ratio revealed a comparable accuracy to that achieved with Light's criteria.

#### CONCLUSION:

Authors found that type of pleural effusion was exudate and transudate. The cause found to be tuberculosis, para pneumonic and malignancy in exudate and in transudate, the cause was heart failure and liver cirrhosis.

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