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A Comparative Study of Pleural Effusion With Reference To Absolute Pleural Fluid Ldh, Total Protien Ratio and Lights Criteria

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Abstract:
Background: *Pleural effusions are frequently encountered problem. Pleural effusion is a sign of diseases and not the diagnosis by itself. Even though detection of the pleural effusion is an easy thing, the etiological diagnosis of the pleural effusion is difficult in a considerable number of cases.*
Aim:*To study the efficacy of absolute LDH of pleural fluid in lights criteria in differentiating transudate and exudate effusions,comparison of efficacy of absolute pleural fluid LDH and lights criteria in differentiating transudative and exudative effusions.*
Materials & methods:*A hospital based prospective observational study was conducted at GHCCD,Visakhapatnam. A total of 45 patients were recruited in the study using inclusion and exclusion criteria. Pleural fluid analysis was done in all patients for protein, ldh, glucose, total and differential count. Subsequent statistical analysis was done using Microsoft excel and SPSS software.*
Results: *Out of 45 cases,29 cases were males and 16 were females, effusions are more on right side, most of the exudative effusions are due to tuberculosis, most of the transudate effusions are due to CHF. Our study shows that 200IU/ml of absolute pleural fluid ldh diagnosed 26 cases as exudate out of 31 cases and 10 cases of transudates out of 14, absolute pleural fluid ldh and total protein ratio has been diagnosed 31 cases of exudate out of 31 cases and 9 cases of transudate out of 14.*
Conclusion: *Absolute pleural fluid LDH is also one of the accurate test in diagnostic separation of pleural effusions into transudative and exudative effusions addition of total protein ratio to absolute pleural fluid LDH increases accuracy, which is equal to lights criteria.*

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I .INTRODUCTION:

An abnormal or excessive accumulation of fluid in the pleural cavity is known as pleural effusion. An accurate etiological diagnosis is very imp to treat the patients .However in about 15%-20% of cases the diagnosis remain undiagnosed. Pleural effusion is a sign of disease and not the diagnosis itself.Even though detection of the pleural effusion is an easy thing, the etiological diagnosis of the pleural effusion is difficult in a considerable number of cases.(1)(2)(3)In the evaluation of pleural effusion the initial step is the characterization of effusions into exudates and transudates, as this gives a clue to the mechanisms and the differential diagnosis.Pleural effusions accompany a wide variety of disorders of lung pleura and systemic disorders. Transudativeeffusions are produced due to disturbance in hydrostatic and oncotic forces, and are predominantly seen in CHF, cirrhosis and nephrotic syndrome.Exudative effusions may result from diseases of the pleural surface itself or from injury in the adjacentlung.Lights criteria identify 98% of exudates correctly, but it is less accurate in identifying transudates.Mostly pleural fluid protein, LDH and cell count are measured to characterize pleural effusions into transudates and exudates.This study is conductedto investigate the utility of absolute pleural fluid LDH in identifying true exudates and transudates and also to compare it with lights criteria.

II .MATERIALS & METHODS:

Study design: Hospital based prospective study.
Study location: Tertiary care teaching hospital based study done in Department of Pulmonary Medicine, Govt hospital for Chest & Communicable Diseases, Andhra Medical College, Visakhapatnam, Andhra pradesh
Study Duration: May 2022 to August 2022
Sample size: 45 patients
Subjects & Selection methods: A total of 45 consecutive patients with signs and symptoms of pleural effusion were selected for the study according to inclusion and exclusion criteria.

Inclusion criteria:

- Patients willing to participate in the study.
- Age >18 years
- Patients presenting to chest OPD with clinical diagnosis of pleural effusion with radiological evidence

Exclusion criteria:

- Age < 18 years
- Patients without definite clinical diagnosis
- Patients not willing to participate in the study

Procedure methodology:
All the patients selected for the study were subjected to the following preliminary investigations:

- A detailed history of every case was obtained including age, sex, socioeconomic status.
- Past medical history
- General examination and physical examination
- Investigations were carried out and recorded in all cases including:
- Normal blood investigations
- Sputum for acid fast bacilli
- Sputum for CBNAAT
- Pleural fluid for cytological analysis
- Pleural fluid for LDH and proteins
- Serum LDH, serum proteins
- Pleural fluid for total count , differential count, ADA, glucose
- Ultrasound chest
- For selected cases pleural biopsy, echo, ecg , RFT, LFT, culture sensitivity
- At final step all the patients were classified into exudative and transudative effusion according to established criteria. Then the role of absolute pleural fluid LDH in differentiating the pleural effusion will be taken up.

After taking all the above investigations the etiological diagnosis is established for all cases either by microbiologically, or biochemically or histopathologically or clinically or radiologically. Then the effusions are divided into exudate or transudate.

Study procedure:

After taking informed consent, all the 45 patients were subjected to diagnostic thoracoscentesis. Once the site for thoracocentesis is identified, the skin surrounding the site is cleaned thoroughly with an antiseptic solution,then the local anesthesia is given with 2% xylocaine to skin, sub cutaneous tissue, muscles and parietal pleura. Then 20 cc syringe with 22G needle is introduced through the intercostal space at the upper border of the lower rib and 10 -20 cc of pleural fluid is aspirated .Then for every patient lights criteria is applied to differentiate whether pleural fluid sample is transudate and exudate.

Pleural biopsy: with a needle biopsy of pleura, a small piece of parietal pleura is obtained for microscopic evaluation. The main diagnosis established with a needle biopsy of the pleura is tuberculous pleuritis and malignancy. A needle biopsy of the pleura currently recommended when tuberculous pleuritic is suspected and the pleural fluid ADA are not definitive and when malignancy is suspected but the pleural fluid cytology is negative and thoracoscopy is not available.

III. Result:

Table no 1:Age and sex distribution of study group.

	MALES	FEMALES
NO	29	16
%	64.44	42.22

Out of 45 cases of the study 29 cases are males 16 are females.
In this study pleural effusions are more common in males.

Side of the effusion in study group:

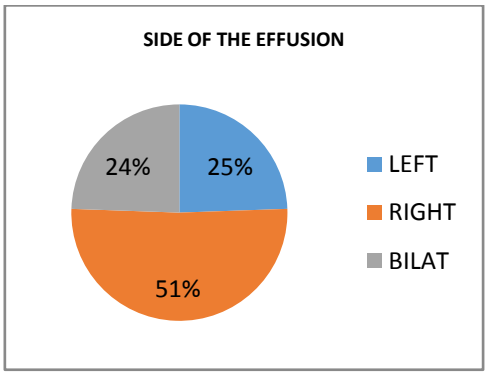

Table no 2: Differentiation of effusions into transudates and exudates by final diagnosis.

FINAL DIAGNOSIS	TRANSUDATE	EXUDATE
EXUDATE		
Tuberculosis	-	21
Malignancy	-	7
Para pneumonic	-	2
Cirrhosis with sbp	-	1
TRANSUDATE		
CHF	8	-
Cirrhosis	4	-
CRF	2	-
TOTAL	14	31

Most of exudative effusions are due to tuberculous effusions and most of the transudate effusions were due to CHF.

Table no 3: Differentiation of effusions into exudate and transudates by absolute pleural fluid ldh>200 iu/l.

FINAL DIAGNOSIS	EXUDATE	TRANSUDATE
EXUDATE		
tuberculosis	17	4
malignancy	6	1
Para pneumonic	2	-
Cirrhosis sbp	1	-
TOTAL	26	5
TRANSUDATE		
CHF	3	5
Cirrhosis	1	3
Crf		2
TOTAL	4	10

Absolute pleural fluid LDH>200 IU/L diagnosed 26 cases of exudates out of 31 cases and 10 cases of transudates out of 14.

Table no 4: Differentiation of effusions into exudate and transudates by lights criteria.

FINAL DIAGNOSIS	EXUDATE	TRANSUDATE
EXUDATE		
Tuberculosis	21	-
Malignancy	7	-
Para pneumonic eff	2	-
Cirrhosis SBP	1	-
TOTAL	31	0
TRANSUDATE		
CHF	5	3
Cirrhosis	1	3
CRF		2
TOTAL	6	8

Table no 5: Differentiation of effusions into exudate and transudates by clinically.

FINAL DIAGNOSIS	**EXUDATE**	**TRANSUDATE**
EXUDATE		
Tuberculosis	21	-
Malignancy	7	-
Para pneumonic	2	-
Cirrhosis with SBP	1	-
TOTAL	31	-
TRANSUDATE		
LVF/CHF	1	7
Cirrhosis	-	4
CRF	-	2
TOTAL	1	13

- Most of the pleural effusions in our study diagnosed as exudate or transudate correctly by clinical examination.

Table no 6: Differentiation of effusions into exudate and transudates by absolute pleural fluid ldh& pleural fluid-serum protein ratio.

FINAL DIAGNOSIS	**EXUDATE**	**TRANSUDATE**
EXUDATE		
Tuberculosis	21	-
Malignancy	7	-
Para pneumonic	2	-
Cirrhosis with SBP	1	-
TOTAL	31	0
TRANSUDATE		
LVF/CHF	4	4
Cirrhosis	1	3
CRF	-	2
TOTAL	5	9

- Our study shows that presence of either FLDH or TPR has been diagnosed 31 cases of exudates out of 31 cases and 9 cases of transudates out of 14.
- Overall 40 cases have been diagnosed correctly with sensitivity and specificity of 100% and 64.3% respectively.

Table no 7: Comparisonof absolute pleural fluid ldh and lights criteria in differentiation of effusions into exudate and transudates.

FINAL DIAGNOSIS	ABSOLUTE PLEURAL FLUID LDH		LIGHTS CRITERIA	
	EXUDATE	TRANSUDATE	EXUDATE	TRANSUDATE
EXUDATE				
Tuberculosis	17	4	21	-
Malignancy	6	1	7	-
Para pneumonic	2	-	2	-
Cirrhosiswith SBP	1	-	1	-
TOTAL	26	5	31	-
TRANSUDATE				
LVF/CHF	3	5	5	3
Cirrhosis	1	3	1	3
CRF	-	2	-	2
TOTAL	4	10	6	8

- Our Study shows that lights criteria diagnosed more cases exudates correctly than absolute pleural fluid LDH. Absolute pleural fluid LDH diagnosed more cases of transudates than lights criteria.
- Overall accuracy of absolute pleural fluid LDH and lights criteria are 80% and 86.66% respectively.

Table no 8: Sensitivity, specificity, ppv, npv and accuracy for parameters studied.

CRITERIA	TP	FP	TN	FN	SENSITIVITY	SPECIFICITY	PPV	NPV	ACCURACY
FLDH>200	26	4	10	5	83.87	71.42	86.66	66.66	80
LIGHTS	31	6	8	-	100	57.21	83.78	100	86.66
FLDH+TPR	31	5	9	-	100	64.3	86.11	100	88.88

IV. Discussion

Characterization of pleural fluid as exudates or transudates is usually the first step in the evaluation of pleural effusion .Once transudate is diagnosed no further workup is generally recommended. But exudative effusions merit further probing to find the cause. Transudative effusions generally are a result of increased hydrostatic pressure (congestive heart failure), decreased oncotic pressure (nephrotic syndrome) or lymphatic obstruction (malignancy).Exudates are due to process, which directly involve pleural(e.g. Para pneumonic effusions, malignancy, pulmonary, infarction, pulmonary tuberculosis etc.,).(1)(5)(6).

In a recent study, isolated pleural fluid LDH was found to be more accurate than LDH and protein depends on serum protein concentration (thus the use of pleural fluid to serum protein ration). Lack of reliability of protein ratio has been shown before for separation of pleural effusions. On the other hand pleural fluid LDH does not depend on serum LDH concentration.(3)(7).Pleural fluid LDH can come from active or dead mesothelial cells and also from active or dead mesothelial cells and also from inflammatory cells involving pleura (as in malignancy, infarction and inflammations). So increasing pleural LDH is a sensitive marker for exudative process and there is no need to use LDH ratio in diagnostic separation of pleural effusion.protein ratio is more reliable but it not only adds to cost and but also has many limitations that merits its use. Though many other criteria have been developed including pleural fluid cholesterol11, pleural fluid albumin gradient12 and pleural fluid bilirubin to serum bilirubin ratio13, their sensitivities and specificities are not better than classic Light's criteria. These new criteria may be helpful in special circumstances where use of diuretics in congestive heart failure can falsely change LDH and protein ratios in favor of exudate.(8)(9)(10) Mobeen Iqbal, Tara jaffery and sajid H Shah had studied on isolated pleural fluid LDH level: A cost effective way of characterizing pleural effusion.

They had studied 62 cases out of which 16 were excluded, remaining 46 cases of which 8 were transudates and 38 cases were exudates. This study shows absolute pleural fluid LDH is more sensitive i.e., 95.6 % and they concluded FLDH is the most accurate criteria for characterizing pleural effusions. (11)

In spite of having more specificity, accuracy with light's criteria when compared with absolute pleural fluid LDH, there is no statistically significant difference between these two criteria in characterizing pleural effusions.

In view of the cost effectiveness absolute pleural fluid LDH is cheaper than Lights criteria, so absolute pleural fluid LDH can be used in characterizing pleural effusions in developing countries like us.

V. Conclusion

Absolute pleural fluid LDH is also one of the accuratetest in the diagnostic seperation of pleural effusions into transudative and exudative effusions, but it is less accurate than lights criteria in diagnosing exudative effusions. Addition of total protein ratio to absolute pleural fluid LDHincreases accuracy, which is equal to or more than lights criteria. As pleural fluid LDH does not depend on serum LDH, there is no need to use LDH ratio in differentiating pleural effusions.

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