Section: Pathology

Original Research Article

STUDY OF CORRELATION OF BIOCHEMICAL AND CYTOLOGICAL FINDINGS IN EFFUSION FLUIDS AT TERTIARY CARE CENTRE.

Anisha Busa[1], Siddhartha Ghelani[2], Kirtibahen Jetapariya[3],Anand Chauhan[4]

[1]*Resident Doctor, Department of Pathology, C.U.Shah Medical College, Surendranagar, Gujarat, India*
[2]*Associate Professor, Department of Pathology, C.U.Shah Medical College, Surendranagar, Gujarat, India*
[3,4]*Assistant Professor, Department of Pathology, C.U.Shah Medical College, Surendranagar, Gujarat, India*

Received *: 13/02/2025*
Received in revised form *: 04/04/2025*
Accepted *: 20/04/2025*

Corresponding Author:
Dr. Anisha Busa,
Resident Doctor, Department of Pathology, C.U.Shah Medical College, Surendranagar, Gujarat, India
Email: anishabusa97@gmail.com

DOI:10.70034/ijmedph.2025.2.105

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2025; 15 (2); 583-586

ABSTRACT

Background: All body cavities are potential spaces contain a scanty amount of fluid for lubrication and for protection of underlying viscera, lined by mesothelial cells. Effusion fluid is an abnormal accumulation of fluid in the body cavity. The peritoneal, pleural and pericardial fluids are the majority of effusion fluids.Effusion Fluid cytology along with LDH, Fluid protein etc. biochemical parameters are useful in diagnosis of inflammatory, infectious, benign and malignant causes for effusion. This study was done to evaluate the incidence of various patholology in effusion fluids by biochemical and cytopathological findings to identify the frequency of neoplastic and non neoplasticetiologies in effusion fluids in a tertiary care centre.

Materials and Methods: The present study is Hospital based data analysis was conducted in the Department of Pathology, C.U.Shah Medical College, Surendranagar, Gujarat from January 2023 to June 2024. A total of 297 samples were included in the study.

Results: Out of the 297 samples studied, 211(71.04%) were pleural fluids, 82(27.61%) were peritoneal fluid and 4(1.35%) were pericardial fluids. Maximum numbers of fluid collected from patients were in the age group of 61–70 years. Male to female ratio of 2.37:1. Out of 297 cases, 85 (28.62%) were transudative fluid and 212 (71.38%) were exudative fluid. Out of 297 cases, 14 (4.71%) were malignant, 279 (93.94%) were benign, 4 (1.35%) were suspicious for malignancy.

Conclusion: Cytopathological examination along with biochemical evaluation of effusion fluids is useful to distinguish between neoplastic and non neoplasticetiologies.

Keywords: Effusion fluid, transudative, exudative, fluid cytology, malignancy

INTRODUCTION

All body cavities are potential spaces contain a scanty amount of fluid for lubrication and for protection of underlying viscera, lined by mesothelial cells. The peritoneal, pleural and pericardial fluids are the majority of effusion fluids.[1,2] These fluids during a disease process undergo qualitative and quantitative changes. Evaluating the changes by biochemical and cytopathological findings, various underlying pathologies can be categorized eg. inflammatory, infectious, and benign or malignant.[3]

Cytological evaluation of fluids is a relatively simple, rapid, inexpensive and less invasive tool having a high accuracy with low incidence of false positive diagnosis.[4] The cytological interpretation of individual cells that are exfoliated into these fluids is of paramount importance since they provide an insight into the diagnostic, prognostic and therapeutic aspect of various pathological processes in the body.

A high sensitivity and specificity of a cytological diagnosis of body fluids is presumably because the cell population present in the fluid sediment provides a more representative sample of a much

larger surface area than that obtained by needle biopsy

Aims and Objective

This study was done to evaluate the incidence of various patholology in effusion fluids by biochemical and cytopathological findings to identify the frequency of neoplastic and non neoplasticetiologies in effusion fluids in a tertiary care centre.

MATERIALS AND METHODS

The present study is Hospital based data analysiswas conducted in the Department of Pathology, C.U.Shah Medical College, Surendranagar, Gujarat from January 2023 to June 2024.

A total of 297 samples were included in the study. All cases of neoplastic and non-neoplastic diseases with effusion of pleural, peritoneal, pericardial cavity were included. Relevant clinical details such as age, sex, history, and accompanying clinical presentations were documented from the requisition form.

From received fluid sample biochemical perameterseg. ADA is tested in RX-50V biochemistry analyser whereas LDH, Protein, sugar are tested in SIEMENS Dimension EXL 200.

By Improved Neubauer chamber total cell count by is done. After that, centrifuged at 2000–3000 rpm for 15 min, supernatant was discarded and air-dried smears were prepared from the sediments. They were stained with Leishman, H and E, and Papanicolaou stains were used for cell count. All the samples were evaluated for biochemical parameters and cytology, and data were summarized and analyzed.

RESULTS

Table 1: Age wise distribution of fluids

Age	Pleural Fluid	Peritoneal fluid	Pericardial Fluid	Total
<11	03	00	00	03(1.01%)
11-20	14	01	01	16(5.39%)
21-30	40	11	00	51(17.17%)
31-40	26	14	00	40(13.47%)
41-50	32	16	00	48(16.16%)
51-60	33	14	01	48(16.16%)
61-70	42	15	02	59(19.86%)
71-80	15	10	00	25(8.42%)
81-90	05	01	00	06(2.02%)
91-100	01	00	00	01(0.34%)
Total	211(71.04%)	82(27.61%)	04(1.35%)	297(100%)

Table 2: Gender wise distribution of fluids

Gender	Pleural Fluid	Peritoneal fluid	Pericardial Fluid	Total
Female	59 (27.96%)	27(32.93%)	02 (50%)	88(29.63%)
Male	152(72.04%)	55(67.07%)	02 (50%)	209(70.37%)
Total	211(100%)	82(100%)	04(100%)	297(100%)(2.37:1)

Table 3: Distribution of benign and malignant lesion

Type of fluid	Benign	Suspiciousof malignancy	Malignant	Total
Pleural Fluid	197(93.36%)	03(1.42%)	11(5.22%)	211(100%)
Peritoneal Fluid	78(95.12%)	01(1.22%)	03(3.66%)	82(100%)
Pericardial Fluid	04(100%)	0	0	04(100%)
Total	279(93.94%)	04(1.35%)	14(4.71%)	297(100%)

Table 4: Distribution of effusion fluid by cytological and biochemical examination

Type of fluid	Transudate	Exudate				Total
		Neutrophil rich	Lymphocyte rich	Suspicious for malignancy	Malignant effusion	
Pleural Fluid	29	41	127	03	11	211
Peritoneal Fluid	56	08	14	01	03	82
Pericardial Fluid	00	01	03	00	00	04
		50(23.59%)	144(67.92%)	04(1.89%)	14(6.60%)	
Total	85(28.62%)	212(71.38%)				297(100%)

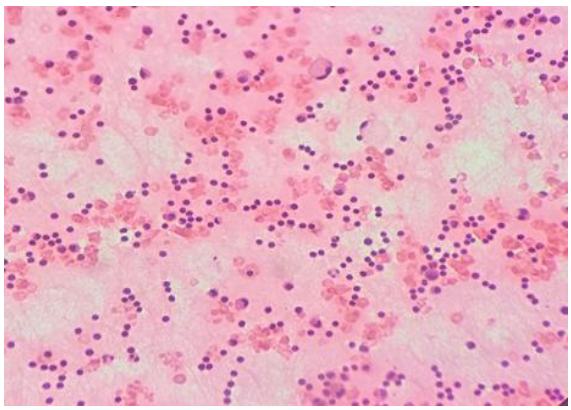

Figure 1: Reactive pleural effusion (H&E,20x)

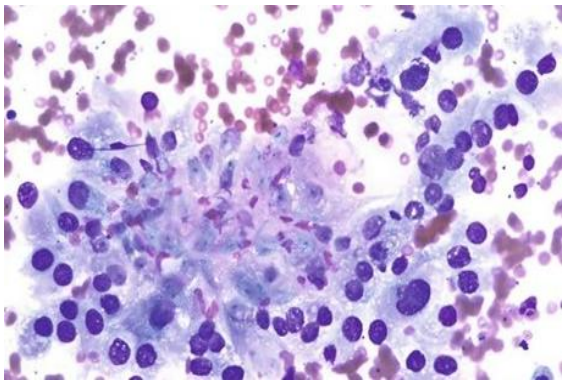

Figure 2: Suspicious for malignancy in pleural fluid(H&E, 40x)

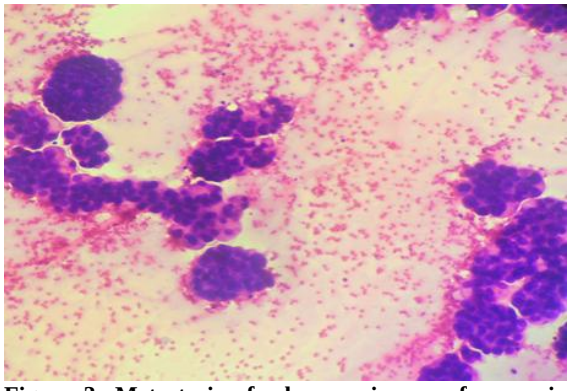

Figure 3: Metastasis of adenocarcinoma of ovary in peritoneal fluid (H&E, 20x)

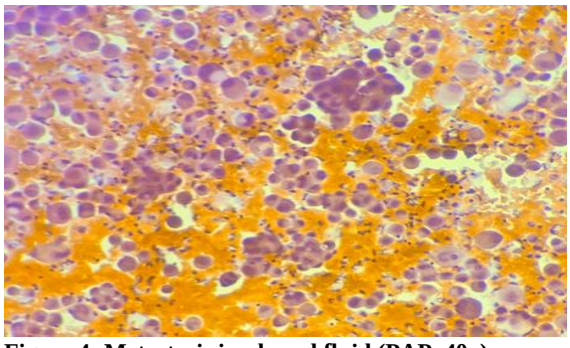

Figure 4: Metastasis in pleural fluid (PAP, 40x)

DISCUSSION

The cytological interpretation of individual cells that are exfoliated into these fluids is of paramount importance since they provide an insight into the diagnostic, prognostic and therapeutic aspect of various pathological processes in the body.[5-7]

This observational study was undertaken for the period of one and half year. A total of 297 various types of effusion fluid samples received in the Department of Pathology, C.U.Shah Medical College and Hospital, Surendranagar,Gujarat were studied for the presence of malignant cells.

In our study, most of the samples received were pleural fluids (211,71.04%) being the common type followed by peritoneal fluid (82, 27.61%) and pericardial fluid (4,1.35%).

In our study fluid samples are received from patient's age groupof 2 years to 97 years. The common age group of fluid sample received was 61 to 70 years (59, 19.86%) followed by 41 to 50years(48,16.16%) and 51 to 60 years(48, 16.16%).

In our study most of the fluid samples belonged to males (209, 70.37%) and (88, 29.63%) of the samples belonged to females. The male to female ratio was 2.37:1 suggesting male preponderance

In our study, 279(93.94%) fluidswerebenign, 14 (4.71%) fluids were malignant and 04 (1.35%)fluid were diagnosed as suspicious of malignancy.

In our study out of 14 malignant lesions, maximum malignant lesions were noted in pleural fluid samples(11,78.57%) followed by peritoneal fluid samples (03,21.42%). While no malignant lesions were diagnosed in Pericardial fluid samples.

In our study, 85(28.62%) fluid were transudative and 212(71.38%) fluids were exudative among which 50(23.59%,)fluids were Neutrophil rich, 144(67.92%) fluids were lymphocyte rich, 4(1.89%) fluids were suspicious for malignancy and 14(6.60%)fluids were malignant.

Light's criteria are used to differentiate between exudative and transudative pleural effusions, classifying an effusion as exudative if at least one of the following is met:a) Pleural fluid/serum protein ratio ≥ 0.5, b)pleural fluid LDH/serum LDH ratio ≥ 0.6 ,c) pleural fluid LDH ≥ 2/3 the upper limit of normal for serum LDH.

Modified Light's criteria for peritoneal fluid identified as exudates if at least two criteria are met: a) Peritoneal fluid/serum protein ratio ≥ 0.5 b) Peritoneal fluid/serum LDH ≥ 0.6 c) Peritoneal fluid LDH ≥ 400 U/L. Or SAAG ratio <1.1 is considered exudative.

Light's criteria for pericardial fluid identified as exudate: a) Pericardial fluid/serum protein ratio ≥ 0.5 and/or b) Pericardial fluid/serum LDH ≥ 0.6 and/or c) Pericardial fluid LDH ≥ 200 U/L.

Neutrophils in clusters and sheet admixed with mesothelial cell and degenerating cells point

towards acute inflammatory process. Recognizing inflammation is important for early treatment.
Smears showing predominance of lymphocytes point towards chronic inflammation like tuberculosis andlymphocytes along with atypical cells point towards malignancy.

Table 5: Comparision with other study

Author	Age	Gender	Fluid	Transudative or exudative	Benign	Suspicious For malignancy	Malignancy	Malignant Fliud
Kol PC et al,[11](2016)	-	-	Peritoneal (57.22%)	-	77.77%	5.50%	16.66%	Pleural
Gupta R. et al,[10](2016)	31-40	Female (61.54%)	Peritoneal (49.7%)	T:20% E:80%	94.59%	-	5.40%	Peritoneal
Khatib WM et al,[9](2016)	41-50	Male (50.24%)	Peritoneal (45.65%)	T:58.45% E:41.55%	83.09%	-	7.48%	Peritoneal
Sharma M. et al.[7] (2017)	51-60	Male (65.51%)	Pleural (45.6%)	T:46.2% E:53.8%	90.40%	4.20%	5.40%	Pleural
SulbhaVS.etal.[8](2015)	31-40	Male (59.8%)	Peritoneal (45.1%)	-	97.40%	-	2.59%	Pleural
Present study (2024)	61-70	Male (70.37%)	Pleural (71.04%)	T:28.62% E:71.38%	93.94%	1.35%	4.71%	Pleural (78.57%)

CONCLUSION

We conclude by saying that cytological and biochemical evaluation of body fluids is of significant utility in diagnostic medicine as it allows us to distinguish between benign and malignant etiologies and at the same time offers rapid diagnosis and staging of metastatic disease. It is a rapid and noninvasive tool but not an alternative to conventional histopathology but it still remains the simplest, cost-effective, reliable, and a definitive aid in reaching to a particular diagnosis.

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