



## Analysis of different types of body fluid through cytopathology received at tertiary care centre: An Observational study

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**ABSTRACT:** INTRODUCTION: Body fluid cytology is a simple and noninvasive diagnostic tool to achieve diagnosis of unknown cases, presence of tumor cells, staging and prognosis of cancer. Effusions can be caused by inflammatory, infectious, and benign; neoplastic or malignant; and primary or metastatic diseases. It also allows one to follow the results of therapy and prognosis  
METHOD AND MATERIAL :After receiving the fluid sample, details like type of fluid, clinical diagnosis, age and gender of the patient were noted. Smear were stained by Giemsa, H&E and pap stain. Cytospin and Cell blocks were prepared and IHC was done whenever required.

RESULT:In the present study,male to female were equal in number, that is male are 79(49.3%) and female are 81(50.7 %).The most common fluid received was peritoneal fluid.Diagnosis of malignant lesions was noted in 5% of the fluid specimens and 3.12% of the fluid specimens were diagnosed as suspicious of malignancy.

CONCLUSION:Fluid cytology is an important diagnostic tool and can be applied as first line diagnostic procedure as it is simple, cost effective less time consuming and gives quick results. Fluid cytology is useful complementary diagnosis for categorizing benign as well as malignant conditions for further management.

**KEY WORDS:** Cytology, Benign, Malignancy, transudate,exudate.

### I. INTRODUCTION

Body fluid cytology is a simple,rapid,inexpensive and relatively less invasive tool to achieve diagnosis of unknown cases, presence of tumor cells, staging and prognosis of cancer. Effusions can be caused by inflammatory, infectious, and neoplastic (benign or malignant); and primary or metastatic diseases. It also allows one to follow the results of therapy and prognosis<sup>(1)</sup>

In body cavities,the pleura encloses the lungs; the peritoneum, the intestinal tract; and the

pericardium, the heart. The parietal and the visceral layers are lined by mesothelium and are separated by a thin layer of lubricating fluid<sup>(2)</sup>beneath which is a layer of connective tissue, supplied with blood vessels, lymphatics, and nerves<sup>(3)</sup>

Transudates accumulate by the filtration of serum across physically intact capillary walls under conditions in which the outflow of fluid through a serous membrane exceeds the normal reabsorptive process. This take place as a result of increased venous pressure, as in congestive heart failure or cirrhosis of the liver, or in hypoproteinaemia in renal failure. Transudates generally have a lower cellular content than exudates and cellular content usually consists of mesothelial cells and macrophages, with an occasional lymphocyte or neutrophilic leukocyte<sup>(3)</sup>.

Exudates result from damage to the capillary walls that ramify in the serosal connective tissue. This damage allows escape of protein and various cellular constituents of the blood into the serous cavity seen in pneumonia, pulmonary infarct, pulmonary abscess, pleuritis, liver abscess, secondary bacterial infection or any malignant etiology.

Cytology of pulmonary lesions provides valuable diagnostic information by minimally invasive procedures like bronchoalveolar lavage(BAL) and pleural fluid. It is valuable investigation in situations where biopsy procedure cannot be attempted due to high risk of hemorrhage<sup>(4)</sup>.

Similarly, urine cytology is helpful to detect urinary tract malignancy.

Cytological study of body fluid is a complete diagnostic modality. First it assists the clinician in formulating and pointing out the etiology of effusion and list of differential diagnoses, secondly it allows one to follow the results of therapy and prognosis<sup>(5)</sup>



**II. METHOD AND MATERIAL**

This observational study was done for the period of 8 months from January 2022 to August 2022 in the Department of Pathology, tertiary care centre, Surat, Gujarat. Total 160 body fluid samples were received in this duration.

Procedure: After receiving the fluid sample, details like type of fluid, clinical diagnosis, age and gender of the patient were noted. Gross description of fluid including volume, colour, turbidity noted and fluid was taken up for processing by centrifugation of the sample and from the sediment smear were made. Smear were stained by Giemsa, H&E and pap stain. Cytospin was also done in low cellularity and Cell blocks were also prepared and Immunohistochemistry(IHC) was done whenever

required. Cell blocks were routinely processed and H&E stain was done. Cytomorphology of the cells was studied and documented paying attention to cellular arrangement, cytoplasmic features and nuclear characteristics.

Microscopic examination was done and results were given. The cases were divided into the three categories benign (like cirrhosis of liver, ischaemic conditions, bacterial & mycobacterial infection, fungal infection etc), suspicious of malignancy and malignancy. Urine cytology was reported according to the "The Paris system for reporting urine cytopathology". Special stains like Ziehl Neelsen stain was performed to identify the acidfast bacilli in suspected cases while silver methenamine to identify fungus.

**III. RESULT**

Gender	Distribution (n = 160)	
	Number	Percentage
Male	79	49.3
Female	81	50.7
<b>Total</b>	160	100

In our study, out of 160 total cases, males were 79(49.3 %) and female 81(50.7%).

**Table-2: Distribution of Patients according to the age and fluid type**

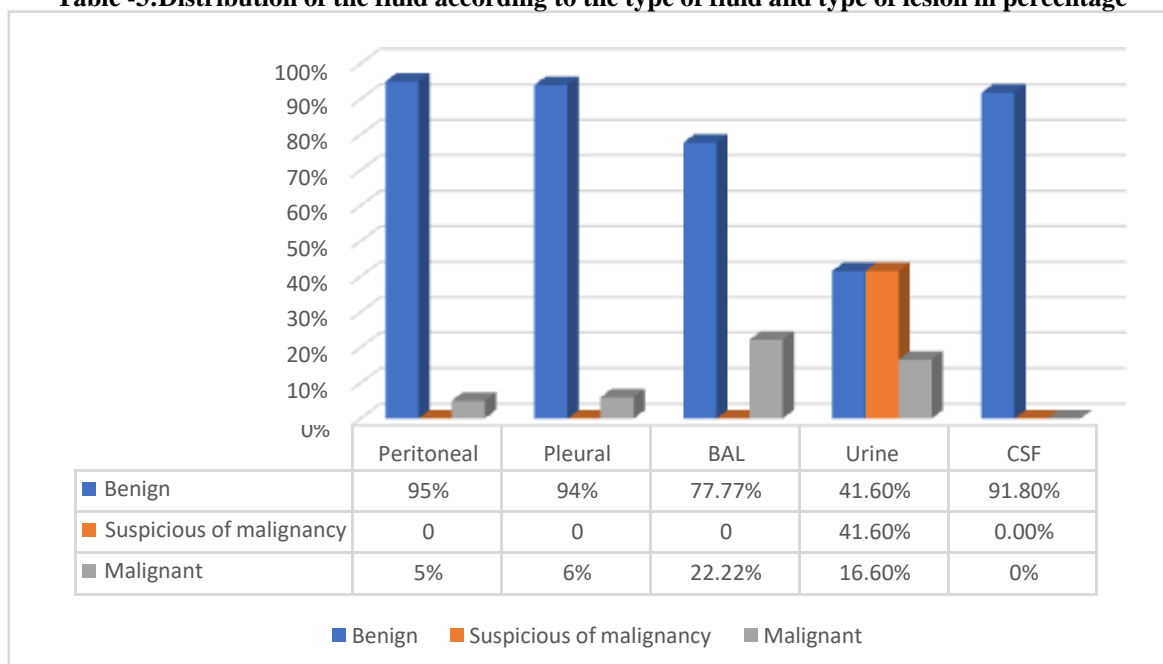
Age Group (Years)	Peritoneal(n=61)		Pleural(n=50)		Urine(n=12)		BAL (n=9)		CSF(n=28)		Total
	Male	Female	male	Female	male	Female	male	female	Male	female	
1 to 30	02	03	02	00	00	01	00	00	03	00	11
31 to 40	05	03	03	02	00	01	01	00	02	00	17
41 to 50	07	10	12	03	01	01	01	00	03	01	39
51 to 60	07	10	08	07	01	01	01	01	07	01	44
61 to 70	02	05	03	05	05	00	02	02	05	02	31
71 to 80	02	04	02	03	01	00	01	00	03	01	17
81 to 90	00	01	00	00	00	00	00	00	00	00	01
<b>Total</b>	25	36	30	20	08	04	06	03	23	05	160

In our study, most common fluid received was peritoneal fluid (n=61), followed by pleural fluid(n=50); CSF(n=28); urine (n=12), BAL(n=9) in the decreasing order of frequency.

Most common age group found was 51 to 60 years followed by 41 to 50 years. Most common fluid received was peritoneal fluid .



**Table -3: Distribution of the fluid according to the type of fluid and type of lesion in percentage**



In our study malignant lesions were found most commonly in BAL .5 cases from urine cytology showed suspicious for urothelial carcinoma.

Highest number of benign/inflammatory conditions were found in the peritoneal fluid

**Table-4: Gender wise distribution of patients according to the type of fluid and type of lesion.**

Type of fluid	Benign(n=147,91.8%)		Suspicious of malignancy(n=5,3.125%)		Malignant(n=8,5%)		Total no of cases
	male	female	Male	female	Male	Female	
Peritoneal	25(41.6%)	33(55%)	00	00	00	02(0.01%)	61(38.125%)
Pleural	30(18.75%)	17(10.6%)	00	00	00	02(0.01%)	50(31.25%)
BAL	05(0.03%)	02(0.01%)	00	00	01(0.006%)	01(0.006%)	09(0.05%)
Urine	03(0.018%)	02(0.01%)	04(0.02%)	01(0.006%)	02(0.01%)	00	12(0.07%)
CSF	23(14.3%)	05(0.08%)	00	00	00	00	28(17.5%)
<b>Total</b>	87(54.3%)	60(37.5%)	04(0.02%)	01(0.006%)	03(0.018%)	05(0.03%)	160

Malignancy(5%) was seen in various body fluids like two cases each in peritoneal ,pleural,urine and BAL cytology Suspicious for malignancy was seen in 5male cases in urine cytology as per Paris system.

**Table-5: Distribution of patients according to the predominant cell type or any organism in fluid.**

Predominant cell type or any organism	Total =160
	No of cases
Lymphocytes	18(11.25%)
Neutrophils	18(11.25%)
Mesothelial cells	54(33.75%)
Atypical cells	13(8.125%)
No predominant cell type	45(28.125%)
Fungal organism	02(0.01%)
Tuberculosis	06(0.03%)



Total	160
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On light microscopy reactive mesothelial cell reaction was most common finding while 13 cases showed atypical cells in various body fluids . 6 cases showed AFB positivity by Ziehl Neelsen stain & fungal organisms were found in 2

cases,one was stained by Silver methamine stain in pleural fluid & other in CSF which was positive for cryptococcus , identified in India Ink preparation.

**Table-6: Distribution of patients according to the malignant lesions**

Malignant lesions	Type of fluid	N= 08		
		Number	Percentage among the malignant cases	Percentage out of total number of cases(n=160)
Adenocarcinoma from unknown origin	Peritoneal fluid	01	12.5%	0.6%
Malignant (Primary Ca ovary)	peritoneal fluid	01	12.5%	0.6%
Adenocarcinoma from unknown origin	Pleural fluid	01	12.5%	0.6%
Metastatic Adenocarcinoma (Primary in Breast )	Pleural fluid	01	12.5%	0.6%
Non small cell carcinoma	BAL	01	12.5%	0.6%
Squamous carcinoma	BAL	01	12.5%	0.6%
High grade urothelial carcinoma	Urine	02	25%	1.25%
<b>Total</b>		08	100%	5%

In our study Adenocarcinoma was the most common malignant lesion in which Ovary & breast was the primary tumor while in 2 cases primary was not detected.In urine cytology 2 cases

of high grade urothelial carcinoma were diagnosed while BAL cytology showed deposits of squamous cell carcinoma & non small cell carcinoma.

**IMAGES:**

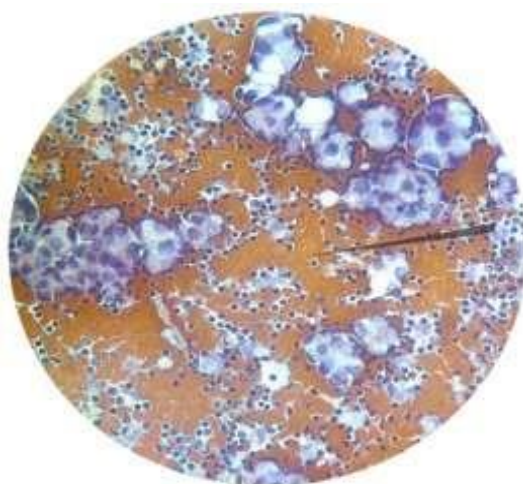


Figure1::ADENOCARCINOMA IN PERITONEAL FLUID (40x)

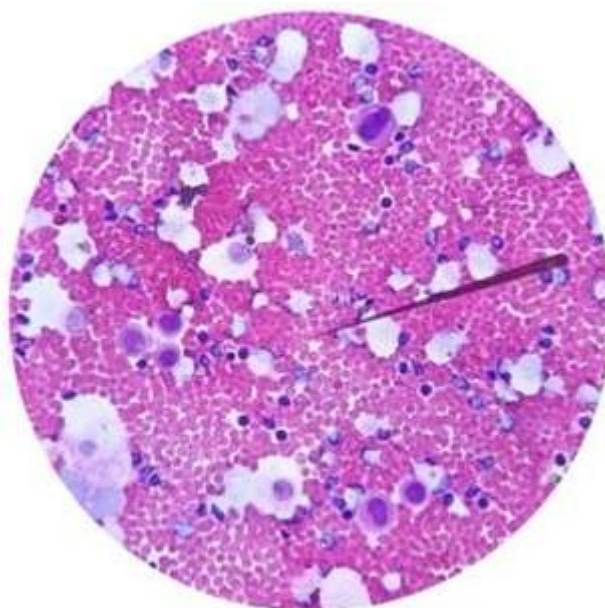


Figure 2: Reactive mesothelial cells(40x)

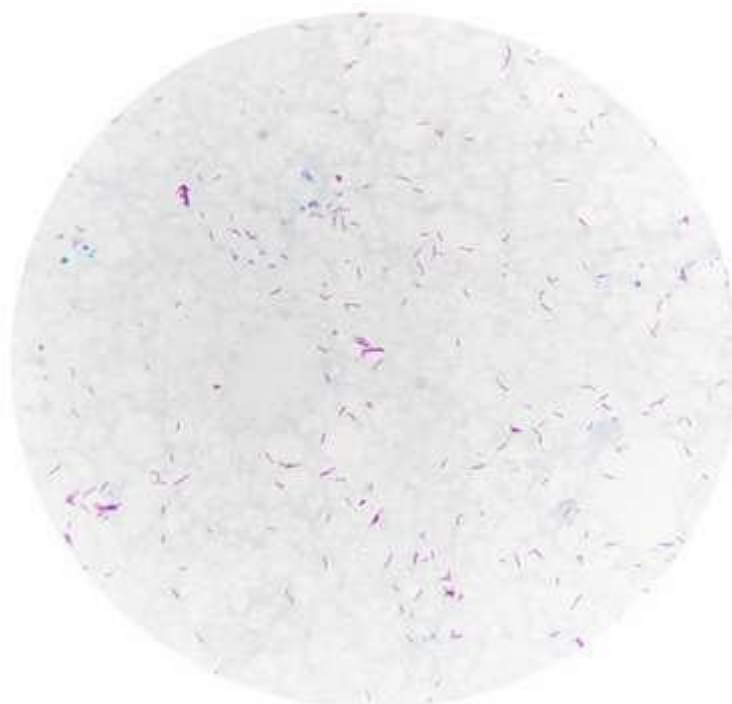


Figure 3: Acid Fast Bacilli on Ziehl Neelsen Stain (oil emmersion)

#### IV. DISCUSSION

Cytological examination of body fluid is of distinct value in confirming malignant pathology or metastasis to the cavities. Since mesothelial tumors are rare, this method is useful to detect metastatic malignant cells to the body cavities. The method is more of prognostic value rather than for the early detection or prevention of further tumor

growth<sup>(3)</sup>. It also helps to differentiate whether the effusion is exudate or transudate. Amongst exudate, it also helps to distinguish if it is parasitic infection, fungal infection or bacterial infection like tuberculosis.

In the present study, male to female were equal in number, male were 79(49.3%) and female were 81(50.7 %) which is similar to the study done



by Khatib WM et al, reported almost equal incidence with males 208 (50.24 %) cases being slightly more than female 206 (49.75%) cases. The common age group of the specimen received are between 51 to 60 years followed by 41 to 50 years.

The most common fluid received was peritoneal fluid, that were 61 in number followed by pleural fluid (n=50). which is similar to the study by Gupta R et al, in contrast to other studies done by Saba H et al, most of the specimens received were pleural fluids (41.6%) followed by peritoneal fluid (31.20%).

We also received 28 CSF, 12 urine and 9 BAL samples in study period.

In this study 91.8 % of the specimens were diagnosed as benign lesions while diagnosis of malignant lesions were noted in 5% cases and 3% of the fluid specimens were diagnosed as suspicious of malignancy.

Hence the frequency of malignancy in this study was 5% which was similar to study done by Saba H et al which was 5.2%. The rate of malignancy observed in the present study is similar to study by Gupta R. et al also reported 10 neoplastic lesions out of 185 fluid samples studied. Khatib WM et al who reported that, 7.48% of the cases were malignant in their study which was slightly high compared to the present study. Kol PC et al (7) of 180 cases, showed malignant effusions in 30 (16.66%) cases which was very high compared to the present Study.

## V. CONCLUSION

The most common malignancy was metastatic adenocarcinoma in peritoneal and pleural fluid followed by high grade urothelial carcinoma. One case of non-small cell carcinoma and one case of squamous cell carcinoma diagnosed in bronchoalveolar lavage.

Among the adenocarcinoma metastasis were found from ovary & breast by using a combination of the cytology and the cell block methods along with clinical and radiological features. In 2 cases primary malignancy was not detected. Cytological examination of body fluid is of distinct value in diagnosing various pathological lesions, specially metastasis of the tumors to the cavities and to detect lung and bladder malignancy. The method is more of prognostic value rather than for the early detection or prevention of further tumor growth.

Thus, fluid cytology is an important diagnostic tool and can be applied as first line diagnostic procedure as it is simple, cost effective, less time consuming and gives quick results. Fluid cytology is useful complementary diagnosis for categorizing benign as well as malignant conditions for further management.

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