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Study of Routine Microscopy and Cytological Analysis of Body Fluids in Tertiary Health Care Centre.

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ABSTRACT

Routine microscopy and Cytological study of body effusions aims at pointing out the aetiology of effusion and prognostication of the disease process. Aspiration of serous cavities is a simple and relatively simple technique to achieve a diagnosis. It is important not only in the diagnosis of malignant lesions, but also help in staging and prognosis. This is a retrospective and hospital based study. All the fluid samples were evaluated for duration of 12 months from January 2022 to December. The clinical information including age, sex, history and provisional diagnosis were noted. All the fluids were grossly examined for quantity, colour and physical characteristics. Biochemical parameters such as protein, sugar and albumin were noted. All fluid samples were analysed in automated fluid analyser for total count and then compared with routine microscopy. Wet mount prepared by adding methylene blue. Centrifuged smears were stained for ZN stain, Gram stain and H& E stain. Cytological diagnosis and categorisation of inflammatory and neoplastic lesions of all fluids were noted. Total 200 body fluids were analyzed. Male preponderance was noted. Maximum numbers of cases were between age ranges of 40-60 years. Out of 200 body fluids, pleural fluid contributes majority of cases (50%), followed by ascitic fluids (40%) and remaining were CSF (20%). Total 12 out of 200 cases were neoplastic cases. Remaining 188 cases were non-neoplastic. Among non-neoplastic, 109 were transudate and 79 were exudative. Maximum cases were of chronic inflammation accounting 150 followed by acute inflammation (38 cases) and remaining 12 cases were malignant. Routine microscopy is more accurate to diagnose exudative and transudative effusion. Routine microscopy and cytological analysis are essential to diagnosis malignancies as it is easy, quick and cheaper modality. Cytology of fluids helps in staging and prognosis of malignancies.

Keywords: Body Fluids, Routine microscopy, Cytology

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INTRODUCTION

Routine microscopy and Cytological study of body fluid is simple and initial step investigation for diagnostic evaluation of body fluids [1, 2]. Most commonly analyzed body fluids are pleural fluid, ascitic fluid and Cerebrospinal fluid. The information provided by body fluid analysis serves several functions. First, it assists the clinician in formulating and pointing out the etiology of effusion and list of differential diagnoses. Second, it allows one to follow the results of therapy and prognosis [1, 3]. Cytology is a study of exfoliated cells and cells aspirated by the needle. Normally, all the body cavities are lined by monolayer mesothelial cells with minimal amount of fluid in it and the main function being the lubrication and safe guarding the underlying viscera [2]. Any imbalance between fluid formation and removal leads to effusion, as stated by Starling's law. [2] Transudative effusions are seen when there is an imbalance of hydrostatic and oncotic pressures and clinically, common causes are congestive heart failure (CHF), cirrhosis and nephrotic syndrome [2]. Exudative effusions are because of injury to the cavity lining and causes for this are malignancy, inflammation, infection, lupus, pulmonary infarction and trauma [2, 3].

The present study was undertaken to examine routine microscopic finding with cytological analysis of body fluids, thus evaluating the diagnostic accuracy of body fluids.

Aim and Objectives

- To study routine microscopic finding with cytological analysis of body fluids.
- Cytological evaluation of body fluids for various pathological conditions at tertiary care centre.

MATERIAL AND METHODS

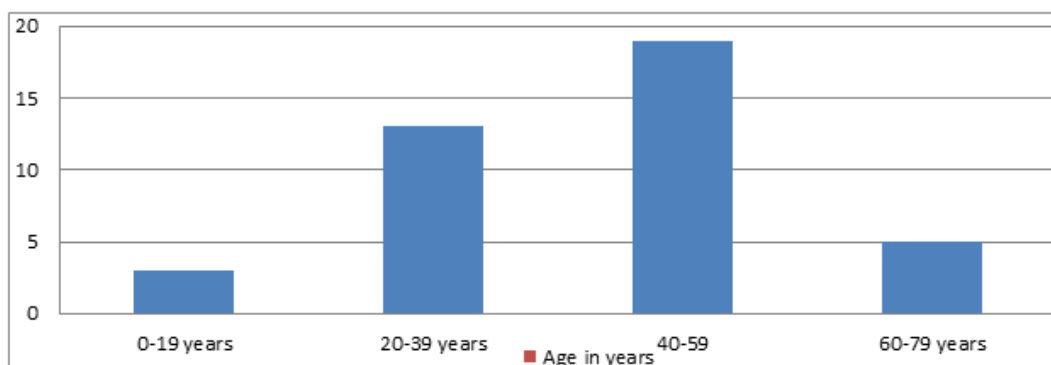
This is a retrolective, hospital-based study conducted at Central Clinical Laboratory & Department of Pathology for duration of 12 months from January 2022 to December 2022. All the fluid samples (pleural, ascitic and CSF) received in the Central clinical laboratory was included in study. The clinical information of cases including age, sex, history and provisional diagnosis were noted. All the fluids were grossly examined with naked eye for quantity, colour, and physical characteristics. Biochemical parameters such as Protein, albumin and sugar these fluids were noted.

All received fluid samples were analysed in automated fluid analyser for total count and then compared with routine microscopy. Wet mount prepared by adding equal amount of methylene blue and fluid to stain WBCs. Methylene blue helps to give differential count of lymphocytes and neutrophils. RBC, neutrophils, lymphocytes, macrophages, mesothelial cells were counted on wet mount. And also predominant cells count was noted.

Around 2 ml sample was taken in test tube and centrifuged at 2500 rpm for 15 minutes, supernatant was discarded and 4 thin smears were prepared from these sediments. One smear stained for ZN stain and second smear for Gram stain. Remaining two slides were stained with H & E (Haematoxylin and eosin) stain.

RESULTS AND OBSERVATION

Figure 1: Age distribution of body fluids



In our present study both routine microscopy and cytological analysis was done for total 200 body fluids. Male preponderance was noted with ratio of 1.66: 1 with 125 cases of male patients and 75 cases of female patients .The analyzed fluids were within age range of 5 – 65 years. Maximum numbers of cases were noted among age range of 40-60 years. (Figure 1)

Out of 200 body fluids pleural fluid contributes major bulk (50%) followed by ascitic fluids (40%) and remaining 10% cases were CSF (cerebrospinal fluid) (Table1).

Table 1: Distributions of various body fluids

Fluid Type	Number	Percentage
Pleural Fluid	100	50%
Ascitic Fluid	80	40%
CSF	20	10%
Total	200	100

Figure 2: Distributions of various body fluids

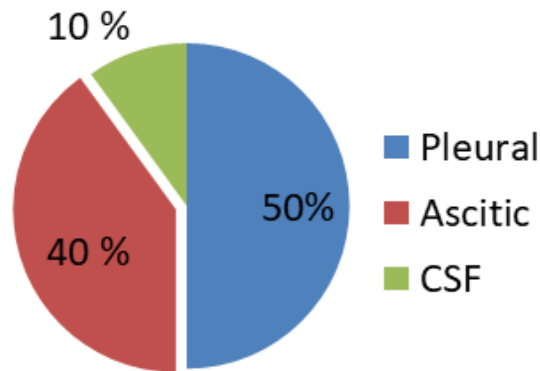
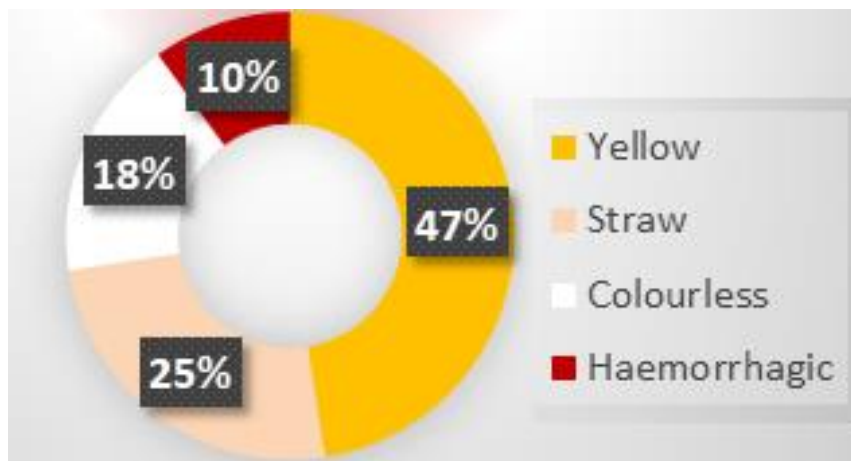


Table 2: Physical examination- color and appearance of body fluids

Colour	Frequency	Percentage
Yellow	95	47.5%
Straw	50	25%
Colourless	35	17.5 %
Haemorrhagic	20	10 %
Total	200	100%

Figure 3: Physical examination- color and appearance of body fluids

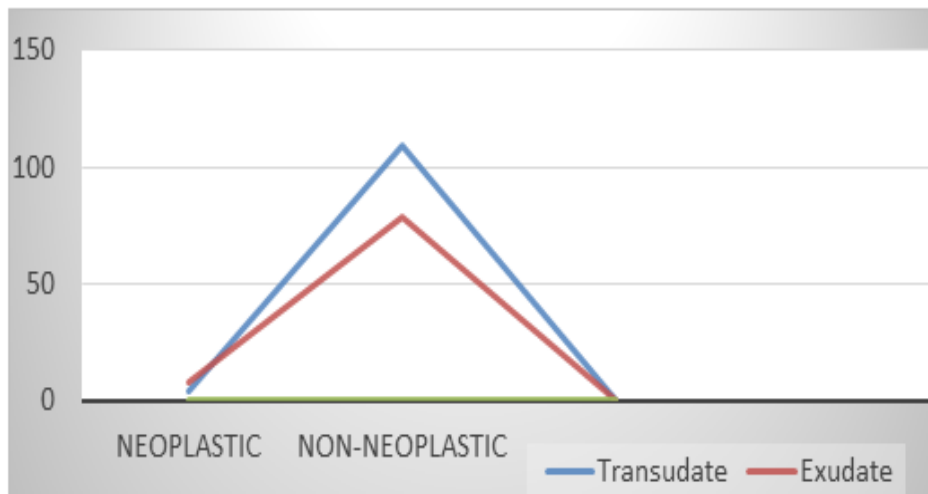


Routine microscopy and cytology of body fluids were analyzed. Total 12 (6%) out of 200 cases were neoplastic cases (4 transudate and 8 exudate). Remaining 188 cases (94%) were non-neoplastic. Among non-neoplastic, 109 were transudate and 79 were exudative. (Table 2, Figure 4)

Table 3: Routine microscopy and cytological diagnosis of body fluids

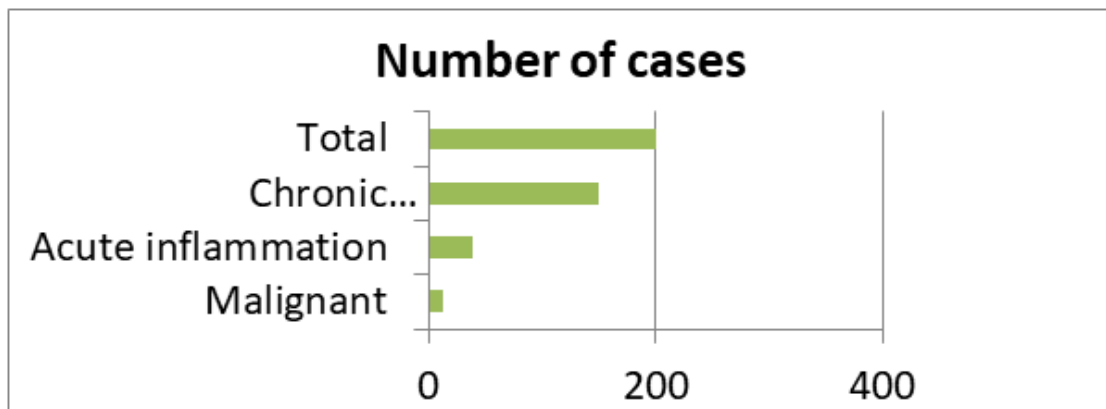
Diagnosis	Transudate	Exudate	Percentage
Neoplastic	4	8	6%
Non-neoplastic	109	79	94%
Total (200)	113 (56.5%)	87 (43.5)	100%

Figure 4: Routine microscopy and cytological diagnosis of body fluids:



Among total body fluids analysed maximum cases were of chronic inflammation accounting 150 cases (75%) followed by acute inflammation measuring 38 cases (19%) and remaining 12 cases (6%) were malignant. (Figure 5)

Figure 5: Distributions of cases diagnosed on body fluids



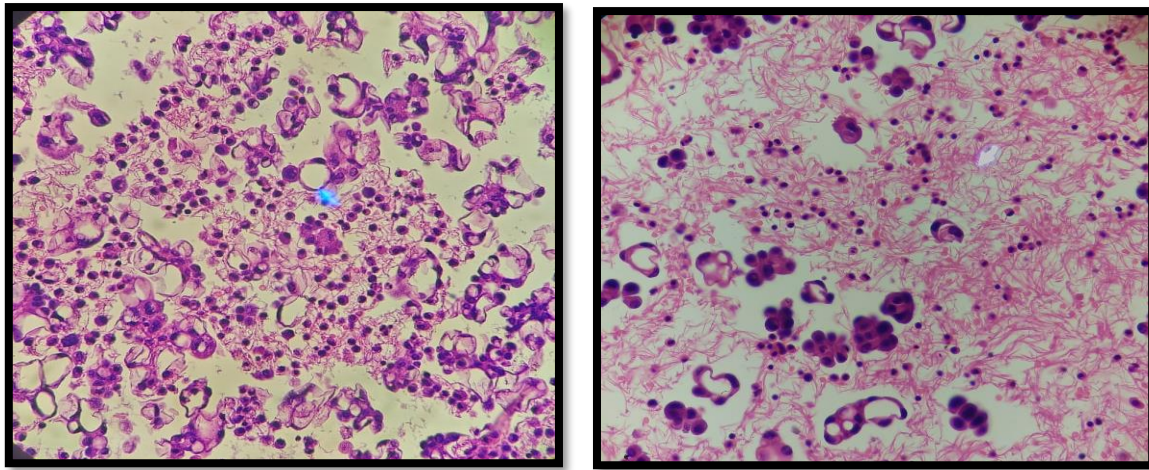


Figure 6: Left - Ascitic fluid showing Signet ring cells suggestive of metastatic adenocarcinoma (H&E, 400X) Right - Ascitic fluid- showing cells glandular pattern with abundant clear to eosinophilic cytoplasm with peripherally pushed pleomorphic, hyperchromatic nuclei suggestive of metastasis of adenocarcinoma (H& E X 100)

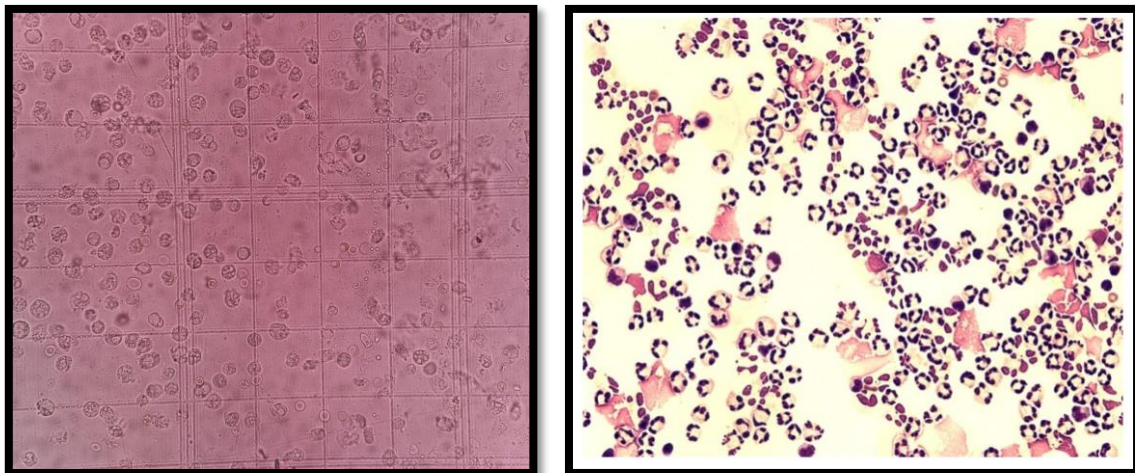


Figure 7: Left- Routine microscopy on Neubauer chamber (400X). Right: cytology showing numerous neutrophils, few lymphocytes and occasional mesothelial cells- suggestive of exudate with acute inflammation (400 X)

DISCUSSION

Cytological examination of serous effusions has been done for nearly a century in the diagnosis of malignancy and eventually in the detection of primary lesions. It has helped for staging and prognosis of the malignant tumours and also gave information regarding various inflammatory lesions of serous membranes [15]. It has gained increased acceptance to such an extent that a positive diagnosis was often considered as a definitive diagnosis [15,16].

Thus, cytological study of body effusions is a complete diagnostic modality which aims at pointing out the aetiology of effusion as well as in certain cases a means of prognostication of the disease process. The diagnostic performance of the cytological study of the fluid may be attributable to the fact that the cell population present in sediment is representative of a much larger surface area than that obtained by needle biopsy [16]. Aspiration of serous cavities is a simple and relatively simple technique to achieve a diagnosis [20]

The cytological examination of serous effusions has increasingly gained acceptance in clinical medicine, to such an extent that a positive diagnosis is often considered the definitive test and obviates explorative surgery. It is important not only in the diagnosis of malignant lesions, but also help in staging and prognosis [18].

Examination of body fluids is the importance in diagnostic, therapeutic and prognostic aspects [20, 21]. Morphological details of cells are sometimes lacking in routine microscopy which lead to difficult in diagnosis. In routine microscopy method, there are plenty of reactive mesothelial cells, inflammatory cells, paucity of representative cells with lack of tissue architecture contribute to considerable difficulties which are faced while making diagnosis [21, 22]. To overcome over this problem cytology of these body fluids contribute major role diagnosis. Under routine microscopy reactive mesothelial cells are close mimickers of malignant cells [23].

Reactive mesothelial cells have been responsible for stimulating malignancy in conventional smear, largely due to formation rosette, pseudoacini or acini, with or without the presence of prominent nucleoli [15-17.] The cell block effectively puts both the features in their proper prospective: That is nucleoli do not appear as prominent as in conventional smear, and the pseudoacinar and acinar pattern can be better appreciated when, in the cell block. Similar findings were noticed in Dekker and Bupp study [19]. Cell Block is a valuable tool in the evaluation of well differentiated adenocarcinoma such as tumors of the breast, lung or gastrointestinal tract. These tumors have few malignant characters in conventional centrifuge, while the presence of true acini is seen in cell block, together with mucin. [18] The other advantage of cell block is concentration of cellular material in one small area that can be evaluated at a glance with all cells lying in the same focal plane of the microscope. It bridges the gap between cytology and histology. [18]

Hence this study was taken to differentiate neoplastic and non-neoplastic. In our present study 200 body fluids were analysed. Most common fluids to be encountered were pleural fluids accounting cases 100 (50%), which is in concordance with kumavat Et al [4].

Male comprised the majority with male to female ratio 1.66: 1, which is in concordance with studies done by Gojiya P [5], Hathila et al [6], Priyanka Kiyawat et al [7].

Among the non-neoplastic body fluids, majority of cases were chronic inflammation (75%). A study done Rajan Prasad also show chronic inflammation as similar to our study.[8] Maximum cases were transudative in nature [113 cases (56.5%)] which is correlating with study done by Kumavat PV et al (4). Number of cases diagnosed as malignant (6%) in present study is correlating with studies done by Sulbha VS et. Al [9], Gupta R. et al [10], and Khatib WM et al [11].

Table 4: Comparative studies showing malignant lesions similar to our study

Author	Malignant lesion (%)
Present study	6.0 %
Sulbha VS et. Al (9)	2.59
Gupta R. et al. (10)	5.40 %
Khatib WM et al. (11)	7.48 %

CONCLUSION

Routine microscopic examination including cell count is more accurate to diagnose exudative or transudative effusion. Routine microscopy and cytological analysis are essential tools to diagnosis malignancies for all fluids as it is easy, quick and cheaper modality. Reactive mesothelial cells have been responsible for stimulating malignancy in conventional cytology. Cell block bridges the gap between cytology and histology by concentration of cellular material in one small area that can be evaluated at a glance. Cytology of fluids helps in staging and prognosis of malignancies.

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