

CYTOPATHOLOGICAL INTERPRETATION OF VARIOUS BODY FLUIDS IN TERTIARY CARE HOSPITAL.

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Abstract

Introduction: Cytological analysis of body fluids has become an important part of the diagnosis and management of patients. The examination of fluids can categorize the fluids into inflammatory and neoplastic.

Material and Methods: This research is a hospital-based observational study of one year, beginning in July 2022 and ending in June 2023. A total of 200 cases were studied in the Central Laboratory, SIMS, Hapur, UP.

Result: Out of 200 cases, the most common fluid was peritoneal fluid, followed by pleural fluid. There was a male predominance in the study. The mean age was 45 ± 15 years. The most common cause of the benign ascitic effusion was alcoholic liver disease and commonest malignancy was metastatic adenocarcinoma. The commonest cause of pleural effusion was tuberculosis.

Conclusion: The study of body fluids is a routine diagnostic test that offers a cheap and rapid diagnosis, which aids clinicians in treatment.

Key words: Body fluids, pleural fluid, peritoneal fluid, CSF, synovial fluid, cytopin.

INTRODUCTION:

Body fluids are known to contain a lot of biomarkers for diseases. Conventional smear examination of body fluids is of paramount importance for diagnosis, therapeutic, and prognostic implications, especially in malignancy.

Effusion is the accumulation of excess fluid in the body. It is always a pathological process.^[1] The study of body fluids has been done for the last 130 years, before World War II^[2]. The serous body cavities are peritoneal, pleural, synovial, and cerebrospinal fluids.^[3] Normally, these cavities are collapsed and lined by a single layer of mesothelial cells.^[1] These cavities contain minimal fluid, which is used for the lubrication of the organs.^[3] Clinically, the fluid can be divided into transudative and exudative effusions.^[1] The dynamics of fluid accumulation are governed by Starling's law, and effusion results in an imbalance between fluid formation and removal.^[6]

Effusion cytology is of paramount importance as it provides insight into diagnostic and therapeutic aspects. It has high sensitivity and specificity because the cell population present in the fluid is representative of a much larger surface area than the needle biopsy. ^[4]The study of fluid can help in diagnosing various inflammatory and parasitic infestations, bacteria, fungi, and viruses, as well as various neoplastic conditions.

Cytological examination of fluids is a less expensive and less invasive tool for diagnosing various pathological conditions. The study of fluid, along with its physical examination, helps in the identification of etiologic factors to follow the natural process of the disease and to monitor for treatment. It can also detect the advancement of the disease in the body. ^[3]

The system for reporting serous fluid in cytology is “International system for reporting serous fluid cytology”.

The present study is to evaluate the role of cytology in different body fluid examination and identify its benefits and pitfalls.

MATERIALS AND METHOD:

The present study was conducted in the Central laboratory, Department of Pathology, Saraswathi Institute of Medical Sciences, Hapur, Uttar Pradesh from July 2022 to June 2023. A total of 200 samples were included in the study. It was a hospital based observational study.

Selection criteria:

- A) Inclusion Criteria: All body fluid samples of pleural cavity, peritoneal cavity, cerebrospinal fluid, synovial fluid and pericardial fluid received during the study period from of all age groups and sex.
- B) Exclusion Criteria: All other body fluids were excluded from the study.

PROCEDURE:

- Approval was taken from the institutional ethical committee and consent was taken from the patients in the clinical department before performing the procedure. Details such as name, gender, age, type of fluid, registration number and clinical diagnosis were noted.
- Gross description of the fluid was noted like volume, color, coagulum and presence of blood. Cell count was done on Improved Neubauer Chamber. Slides were prepared from cytocentrifuge (Medspin 4 cytospin) at 2000 rpm for 5 mins, sediment was directly smeared on the slide. Slides were air dried and fixed in 95% ethanol, then stained with Giemsa and Papanicolou stain. Once the slides were stained, cytomorphological details such as nuclear and cytoplasmic features were recorded.

RESULT:

The sample size in the present study was 200 cases. The age range of the group varied from 2 years to 80 years of age. The maximum number of cases was between the age groups 40–44 years, followed by 50–59 years.

Males constituted 117 of 200 (58.5%) cases, and females comprised 83 of 200 (41.5%) cases. The male-to-female ratio is 1.4:1. The commonest fluid was peritoneal fluid (95/200), with 51 males (53.6%) and 44 females (46.3%), followed by pleural fluid (80/200), CSF (20/200), and synovial fluid (05/200).

Out of 95 cases of peritoneal fluid, 83 were non-neoplastic, which consisted of benign, reactive pathology, and 12 were neoplastic, which comprised atypia of undetermined significance, suspicious for malignancy, and malignant. The malignancy observed in the peritoneal fluid were adenocarcinoma and had an unknown primary

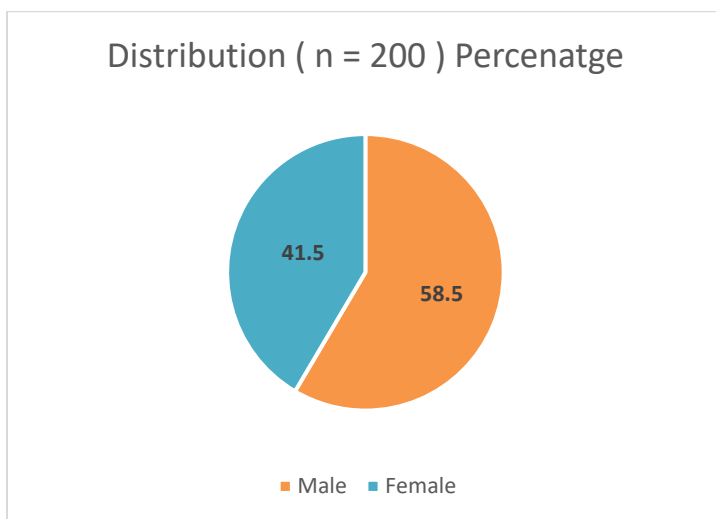
Out of 80 cases of pleural fluid, 74 were non-neoplastic, comprising benign and reactive, and 06 were neoplastic consisting of suspicious of malignancy and malignant. All the malignancies had an unknown primary source.

A total of 20 CSF cases were present, 18 were non-neoplastic and showed normal findings. Two patients had viral meningitis.

We received a total of 05 samples of synovial fluid, and out of these cases, 4 were suppurative, whereas 1 was non-suppurative.

No pericardial fluid was received during the study period.

Chart No. 1: Distribution of patients according to gender.



Type of Fluid	Total	Benign		Reactive		AUS		Suspicious Of Malignancy		Malignant	
		Number	%	Number	%	Number	%	Number	%	Number	%
Ascitic	95	59	62.11	24	25.26	3	3.16	7	7.37	2	2.11
Pleural	80	54	67.50	20	25.00	0	0	4	5.00	2	6.25
CSF	20	20	100.00	0	0	0	0	0	0	0	0
Synovial	5	5	100.00	0	0	0	0	0	0	0	0
Total	200	138	69	44	22	3	1.5	11	5.5	4	2

Table 1: Distribution of Patients to the type of fluid and type of lesion.

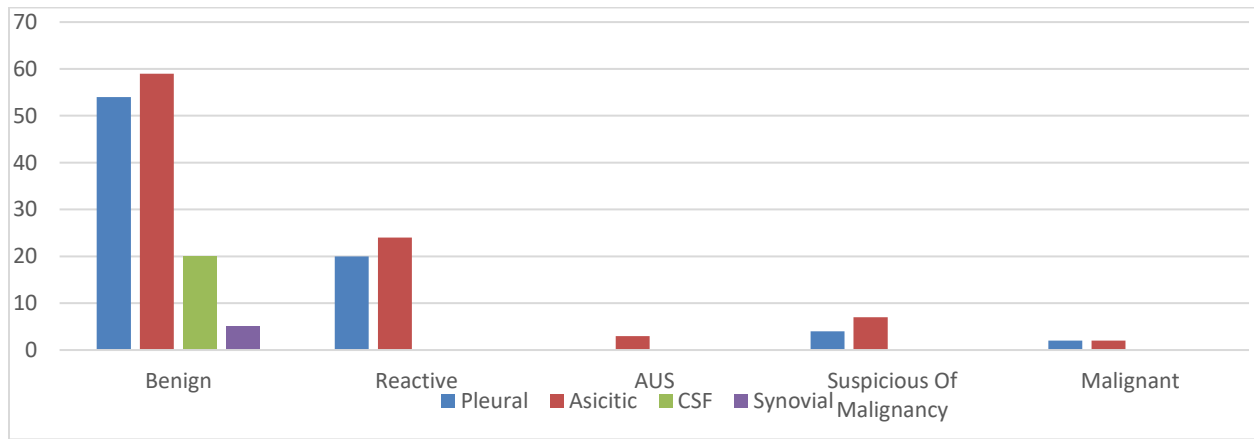


Chart 2: Distribution of Patients according to the type of body fluid and type of lesion.

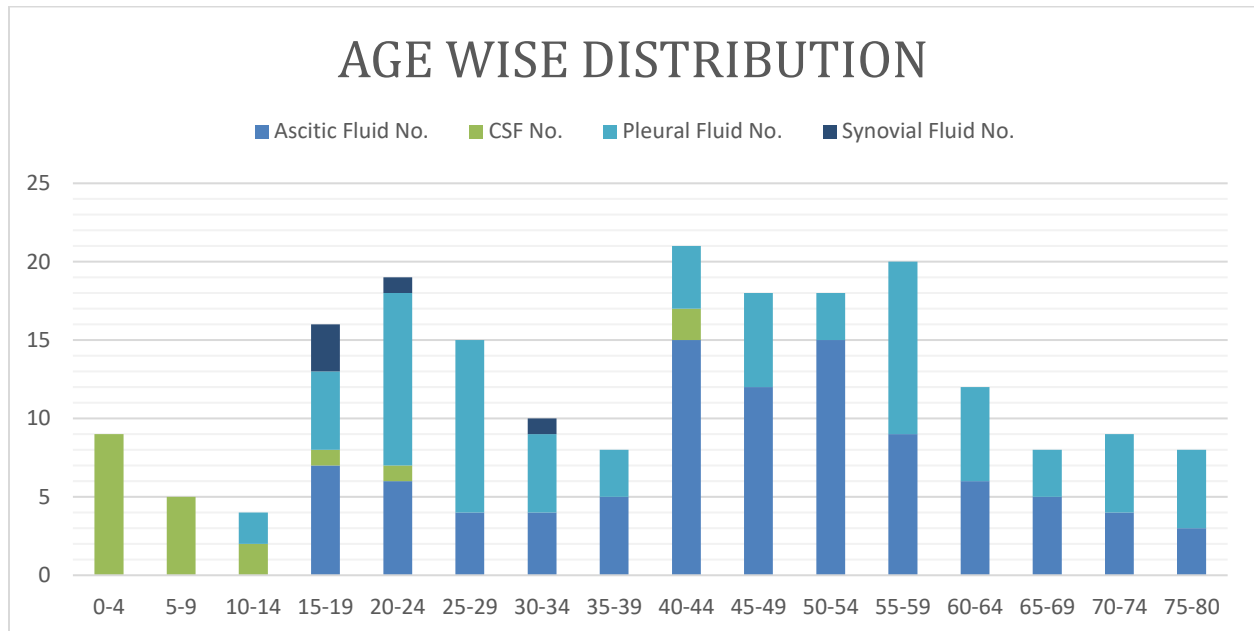


Chart 3: Distribution of Patients according to the age and the fluid type.

DISCUSSION:

Serous effusion cytology dates back to the 19th century. In 1882, Quincke gave detailed descriptions of lung cancer in serous effusions.^[5] Lucke and Klebs were the first to note the presence of malignant cells in an ascitic fluid in 1867.^[5]

Main body fluids like pleural, peritoneal, synovial, CSF, and pericardial fluid are normally present within respective body cavities in minimal quantities, with their constituents in specific proportions. The fluids during a disease process undergo qualitative and quantitative changes.^[4] Incidence of effusions in patients has increased in the last few years. It has been required to study all the effusions for cytological features and provide reliable results for them.^[6,7]

The advantages of fluid aspiration lie in the fact that it is an easy and safe procedure.^[3] The number of samples received in the lab is increasing, and the clinicians use the effusion cytology report as an accessory tool for further diagnosis and treatment.^[3] The diagnostic pursuance of the effusion cytology may be traceable to the fact that the cell population represents the large surface area.^[8] Examining the fluids can diagnose both neoplastic and non-neoplastic conditions and inflammatory conditions such as bacteria, fungi, parasitic infections, and viruses.^[4]

Effusions can be classified into transudates and exudates. Transudates are usually caused by hypoalbuminemia and leakage of fluid from efferent intestinal lymphatics, whereas exudates are usually caused by increased vascular permeability or increased intrahepatic hydrostatic pressure. Cytological examinations are often helpful in evaluating patients with modified transudates. Exudates consist of inflammatory, neoplastic, and chylous effusions. Inflammatory exudates contain inflammatory cells, which may be specific or non-specific. Cultures are required to assess if sepsis is present and identify the organism. Neoplastic fluids contain numerous atypical cells. Chylous effusions contain a large number of lymphocytes and variable neutrophils.^[9]

In this study, it was found that most of the samples belonged to males (58.5%), and 41.5% of the samples belonged to females. The male-to-female ratio was 1.4:1, which shows male preponderance. These findings were similar to those of Mahajan S. et al.^[10] from Moradabad, India, where 58.6% of the samples belonged to males, which was in agreement with the present study. Another study by Shulbha VS et al.^[3] from Mandya, Karnataka, and Saba H et al.^[4] from Bengaluru, Karnataka also shows male predominance with 61% and 59.2%, respectively. Whereas, in contrast to the present study, a study by Ayyagiri Sudha et al.^[11] from Hyderabad reported female preponderance with a male-to-female ratio of 1:1.17, and another study by Khatib WM et al.^[12] showed almost equal incidence with males 208 (50.2%), which is slightly more than females 206 (49.5%).

In the present study, most of the specimens ranged from 2 years of age to 80 years of age. Based on the data, the most common age group of fluids was 40–49 years (19.5%), followed by 20–29 years (17%). However, 7% of cases belonged to the age group 2–10 years, and 37.5% of specimens belonged to elderly individuals. The mean age was 45±15 years which suggests that the majority of cases belonged to the elderly and middle-aged age groups.

The mean age observed in this study was similar to the study by Khatib WM et al. ^[12] who also reported that the majority of cases were in the age group 40–50, with the mean age being 46.6 years. This study is also comparable to the studies done by Shulbha et al. ^[3], Pradhan SB et al. ^[13] Whereas the study done by Shobha SN et al. ^[8] showed a maximum number of cases in 51–60 years and the least number of samples were from 1–10 years of age compared to older people, which was similar to our study.

In this study, there were a wide number of differential diagnoses, the most common being liver disease, tuberculosis, pneumonia, and neonatal seizures in the CSF.

In our study, most specimens received were of Peritoneal fluid (47.5%), followed by pleural fluid (40%), CSF (10%), and synovial fluid (2.5%). In a study by Ashok K. Deshpande et al. ^[2], peritoneal fluids were received in 62% of patients, which was similar to our study. Another study by Khatib WM et al. ^[12] (45.6%) and Shulbha VS et al. ^[3] (45.1%) also showed the predominance of peritoneal fluid followed by pleural fluid. In contrast to Ayyagiri Sudha et al. ^[11] (49%), Sharma M et al. ^[14] showed a predominance of pleural fluid in 45.6% of patients. This contrast in the study observed between the frequency of the type of fluid in this study and other studies may be because of the common clinical diagnosis of liver disease in the present study and the different sample size as well as the selection criteria in the different studies.

In the present, most of the fluids had a pale-yellow colour (95%), and a few were haemorrhagic (5%). The most common cell type in the fluid was lymphocytes (80%), followed by mesothelial cells (20%). Recognizing inflammation is important for early treatment. ^[4]

The fluids were classified into different categories according to the Indian Academy of Cytologists for reporting serous effusions.

In this study, the majority the specimens [69%] were diagnosed as Benign, 22% were Reactive effusions, the diagnosis of Malignant lesion was 2%, and 5.5% of the specimens belonged to the category Suspicious of malignancy. The most common fluid in the study was peritoneal fluid, i.e., 47.5%. Out of 95 samples of peritoneal fluids received, 59 (62.11%) were benign effusions and 24 (25.26%) were reactive effusions. The most common cause of the benign ascitic effusion was alcoholic liver disease, leading to cirrhosis and the accumulation of fluid. The commonest cause of pleural effusion was tuberculosis.

The number of cases of malignant effusion was similar in both pleural and peritoneal fluids. The rate of malignancy i.e. 2% observed in the present study was less than the study by Saba Husain et al. ^[4] who reported a rate of malignancy of 5.2%. Khatib WM et al. ^[12] reported a malignancy rate of 7.8%, which is high compared to the present study. Sulbha VS et al. ^[3] reported 4 neoplastic lesions out of 174 cases, that is 2.29%, which was similar to the present study. Kol PC et al. ^[15] reported the rate of neoplastic lesions as 16.66%, which was very high compared to the present study. In our review, haemorrhagic aspirates were often associated with malignancy. Malignant aspirates were hypercellular smears with cells either scattered or in acinar pattern having high nucleo-cytoplasmic ratio, prominent nucleoli and scant cytoplasm. The primary cause of malignancy was not known, as patients were lost to follow-up.

The present study showed that fluid cytology is very helpful in classifying the conditions into inflammatory, benign, and malignant conditions. It also plays a very useful role in the rapid diagnosis of malignant effusions. Although fluid cytology is not a substitute for histopathology, it acts as a complementary tool for diagnosing different benign and histopathological conditions.

CONCLUSION

The study concludes that the cytology of fluid is an important tool in the evaluation of body cavities. It is rapid, painless, cost-effective, and simple. Ancillary studies such as cell count, biochemical, microbiologic evaluation, cell block, and IHC help in accurate diagnosis.^[11]

Conflict Of Interest – None

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