

Cytomorphological Features Of Body Fluids

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I. Introduction:

Body fluid cytology is an important diagnostic test for various malignant and benign conditions. Effusions can be caused by inflammatory, infectious, benign, neoplastic or malignant and primary or metastatic diseases. Such conditions in effusions may often have overlapping features and mimic one another both cytomorphologically and clinically, presenting diagnostic challenges¹.

Effusion is a pathological process. Accumulation of excess fluid in the body cavity is known as effusion and clinically effusion can be divided as transudative and exudative.

All the body cavities are lined by its native mesothelial cells and are lubricated by small amount of free fluid. These fluids are increased under various pathological conditions. Peritoneal, pleural, cerebrospinal, synovial and pericardial fluids comprise the majority of fluid specimens in pathology laboratories. Tapping and analysing these fluids in terms of biochemical parameters and cytology not only serves in therapeutic and diagnostic intervention but also aids in disease monitoring, prognosis, staging of tumors and treatment outcome².

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.

Cytological examination of these fluids helps in diagnosing both non neoplastic and neoplastic conditions. Most important of these is the recognition of a malignant pathology. But many other conditions such as inflammatory diseases, parasitic infestations, bacterial, fungal and viral infections can also be identified. 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. (The purpose of present study is to evaluate the significance of fluid cytology for various pathological conditions both benign and malignant in a tertiary care hospital.

Cytological study of body fluids 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 prognosis¹.

Cytological examination of the fluids along with physical examination helps the pathologist to identify specific etiologic agent, to follow the natural process of disease and to monitor the response to therapy. The study of fluid cytology has paramount importance in identifying atypical cells in effusions which helps to know the advancement of the disease process in the body. The present study also gives us an insight to understand the neoplastic and non-neoplastic conditions such as inflammation and parasitic infestation causing effusions⁶.

II. Materials And Methods

The present study was conducted in the Cytopathology lab, Department of Pathology, Saraswathi Institute of Medical Sciences, Hapur, Uttar Pradesh. A total of 100 cases included.

Study Design: Hospital based retrospective study.

Study Period: Study was conducted over a period of around 6 months till 100 cases were enrolled.

Source of Data: All the samples received during the study period in cytopathology lab, department of pathology, Saraswathi Institute of Medical Sciences, Hapur, Uttar Pradesh were studied.

Sample Size: A total of 100 cases were included in the study.

Selection criteria:

Inclusion Criteria

Pleural fluid and ascitic fluid samples coming to cytopathology laboratory were included in the study.

Exclusion Criteria

1. Sample <3 ml volume

2 Samples received in unsterile container

3 Samples in unlabelled container.

Procedure:

Complete clinical history, clinical examination along with all relevant blood, serum and radiological investigations of the patients were taken by filling the cytopathology form at the time of admission. All the received samples were centrifuged at 1500-2000 rpm for 10 minutes in cytospin machine. Supernatant was discarded and both wet smears and air dried smears were prepared from sediments. They were stained with MGG and papanicolaustain. Improved Neubauer chamber was used for cell count. All the samples were evaluated for cytology, data was summarized and analyzed.

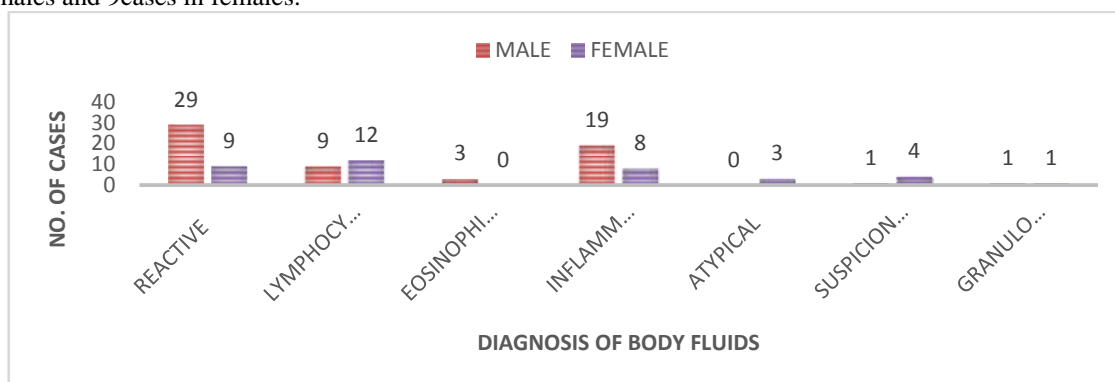
III. Review Of Literature

- A observational study has done on 250 samples of body fluids done in Rajarajeswari medical college and hospital Department of Pathology Bangalore. Most of the fluid samples belonged to males (59.20%) and the male to female ratio was 1.45:1. The common age group of specimen received was 40 to 50 years (21.20%). Most of the malignant lesions (53.85%) and lesions suspicious of malignancy (66.67%) belonged to peritoneal fluid¹.
- A total of 311 body fluid samples were analyzed in DR. B R Ambedkar medical college, Bangalore Karnataka. In this study they observed that Pleural fluid comprised of the major bulk of the study with 120 cases followed by peritoneal fluid with 100 cases. Non-malignant diagnosis was given in majority of the cases. Slight male preponderance was noted with male to female ration 1.37:1³.
- A 5 year descriptive, analytical and retrospective study was done in a tertiary care centre from January 2012 to January 2017 in AMU India. A total of 4197 sample of effusion fluids from various sites were analyzed retrospectively. Pleural fluid cases, 2056(49%) was commonest followed by peritoneal fluid and cerebrospinal fluid with, 1847(44%) and 126(3%) cases respectively. Pericardial and Synovial fluid were least common with only 84(2%) cases each. Majority of cases were Reactive in nature. Metastatic adenocarcinoma was the commonest malignancy encountered in both pleural and peritoneal fluid. Most of the patients were in 5th decade with age range between 3 to 87 years. Male preponderance was observed with M: F ratio of 1.11:1.²
- A study done by Shulbha et al on 385 fluid samples, concludes that males constituted 235 of 385 cases and females comprised of 150 of 385 cases. Male to female ratio was 1.56:1. The most common fluid was peritoneal fluid (174/385) with 104 males (59.8%) and 70 females (40.2%), followed by CSF (100/385), pleural fluid (94/385), sputum (09/385) and synovial fluid (08/385) Out of 174 cases of peritoneal fluid, 170 were non neoplastic and 04 were neoplastic. The nonneoplastic transudates were 154 and non-neoplastic exudates were 16. All the 04 cases of neoplastic effusions were exudates in nature. The malignancy observed in peritoneal fluid was adenocarcinoma seen in all 04 cases. Of these 02/04 cases (50%) had primaries in ovaries and 02/04 (50%) had unknown primary. Out of 94 cases of pleural fluid, 88 were non neoplastic and 06 were neoplastic. Of the 88 cases, 82 were non neoplastic transudates and 06 were non neoplastic exudates. Adenocarcinoma was the most common malignancy seen in all the 06 cases. Lung was found to be the primary in 04/06 cases (66.6%) and 02/06 cases (33.4%) had unknown primary⁵.
- Jha et al reported that out of 65 cases, 44 (67.7%) effusions were reported negative, 15 (23.1%) were positive and 6 (9.2%) were suspicious for malignancy. Thus total 21 effusions (32.3%) were tumour cell positive. All 21 (100%) were true positive, none (0%) was false positive, 28 (63.6%) were true negative and 16 (36.4%) were false negative. Thus ascitic fluid cytology had sensitivity of 56.7% and specificity of 100%. Predictive value of positive test and negative test was 100% and 63.6% respectively. Stomach was the most common primary site of malignancy associated with ascites (11/37 i.e. 29.7%) where as adenocarcinoma was the most common type of malignancy (11/15 i.e. 73.3%) in ascitic fluid cytology.⁶

IV. Results

In our study cytological analysis was done on 100 cases of (pleural and ascitic) fluids. The female to male ratio of these fluids are 1:1.5 with 40 females and 60 males. The range of age group in our study varies from 10 to 80 years with maximum cases in age group of 40-50 years. So most common age group affected is 4th decade. Mean age of presentation in both genders are 45 years. The most common fluid in our study is pleural

(60cases) followed by ascitic fluid (40cases) and the most common diagnosis is reactive pathology with 29cases in males and 9cases in females.



Gender Wise Distribution Of Cases

	TOTAL CASES	MALES	FEMALES
PLEURAL	60	38	22
PERITONEAL	40	24	16

Lymphocytic rich

In lymphocytic rich category 9cases comprising of males and 12cases in females . A high lymphocyte count is most commonly associated with tubercular pleural effusion but chronic effusion can often have a high lymphocytic ratio of 50% or more. The most common etiologies which produce lymphocytic effusion are t.b, malignancy and ccf⁷.

Inflammatory smear

Out of 100cases 19cases (male) and 8cases (female) showed inflammatory smear. A neutrophil count of more than 50% of the total leucocyte count is commonly seen with pleural fluid effusion⁸ but it has been shown that about 10% of tubercular effusion can also be neutrophil dominant.

Eosinophil rich effusion

Only 3cases in male presented with eosinophil rich.it is unusual for an effusion to be composed predominantly of eosinophil, if numerous eosinophils are present, it should be reported in report and correlated with clinical history. The presence of eosinophils is most commonly related to the introduction of air into a mesothelial lined space and may be associated with prior paracentesis or hemothorax. Other causes include malignancy, infection, pulmonary infarction and hypersensitivity reaction^{9,10}.

Atypia

Only 3cases in our study out of 100cases showed atypical cellular morphology. Atypia of undetermined significance diagnostic category is reserved for effusion specimens that lack quantitative or qualitative cytological features to be confidently diagnosed as either benign or malignant and exhibit sufficiently clear morphologic features to exclude the possibility of classifying them as nondiagnostic.

Criteria: as compared to normal reference cells of similar derivation, atypical cells may show the following:

- mild to moderate nuclear enlargement and slightly increased nuclear to cytoplasmic ratio.
- prominent nucleoli or variable nucleoli
- slight nuclear membrane irregularities.
- altered chromatin.
- altered cytoplasm¹¹.

Suspicion of malignancy/ malignant

Out of 100cases only 5cases were present with suspicious for malignancy. Out of 5cases 1male and 4female showed the same finding. The suspicious for malignancy category is defined as one in which evidence falls short of confirming malignancy based on cytomorphology and results of any ancillary tests performed¹¹. Most study imply that clinician usually manage patients with suspicious effusion the same way as those with proven malignant once taking clinical data into account, therefore use of sfm should be reserved for cases where malignancy is highly probable¹².

V. Discussion:

Cytological examination of serous effusion in adults has been widely known and documented in various pathological condition also the smear prepared from the cell population present in the fluid sediment is much more representative and has higher sensitivity and specificity than that obtained by needle biopsy².

The most common cause of pleural effusion are pneumonia, heart failure, pulmonary embolism and cancer and delay in diagnosis of etiological cause can lead to complication and cause severe morbidity and mortality.

Non malignant pleural effusion are not infrequently indicator of poor prognosis in patient with cardiac, renal or hepatic failure with one year of mortality of 57%, 46%, and 25% respectively¹⁶.

Ascitic is defined as collection of excessive fluid in peritoneal cavity, our study aim to evaluate various cytomorphological findings in exudative and transudative effusion.

The examination of cytomorphological feature of ascitic fluid helps in diagnosis of the cause of ascitic like

1. Malignancy

-primary: mesotheliomas

-secondary : metastasis, lymphomas, leukemia

2. Specific chronic inflammatory condition

3. Non-specific inflammatory condition

4. Parasites

5. Acute purulent ascites- acute appendicitis, acute pancreatitis.

It is very necessary to differentiate neoplastic condition from non- neoplastic conditions as treatment modalities are different

	OUR STUDY	AR Piyush etal ²	Sharma etal ¹³	Sheetal etal ¹⁴	Pragya etal ¹⁵
MEAN AGE	45.0	49.1			
MALE:FEMALE	1.5:1	1.1:1	1.9:1		1:1.7
TOTAL NO. OF CASES	100	4179	500	375	150
PLEURAL	60%	49%	45%	48.8%	50%
PERITONEAL	40%	44%	36%	27.2%	23.5%

Maximum age group-40-50years

Maximum diagnosis- Reactive

In this study the most common fluid was the pleural fluid (60cases) followed by peritoneal fluid (40cases) which is concordance with A.R.Piyush et al.

Sharma et al also showed same results

Other study Shetal etal, Pragya etal also showed same result where pleural fluid was the commonest type of body fluid followed by peritoneal fluid

In our study male to female ratio is 1.5:1 which is similar to other study where male population is predominant.

In our study majority of cases show reactive pathology

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