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Original Research Article

Clinicocytological Evaluation of Peritoneal Fluid in patients attending PJMCH, Dumka: A Prospective Study from Phulo Jhano Medical College and Hospital, Dumka

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Abstract

Background: Ascites is defined as accumulation of fluid in the peritoneal cavity. Cytological examination of peritoneal fluid is minimally invasive technique and helps to identify the pathology and decide the clinical management.

Objective: To evaluate the clinicocytological features of peritoneal fluid in patients attending Phulo Jhano Medical College and Hospital, Dumka, Jharkhand.

Methods: The study is prospective observational study. This study was conducted in the Department of Pathology, Phulo Jhano Medical College and Hospital, Dumka over a period of 24 months. The samples collected from 385 patients after acquiring proper informed and written consent were examined for cytological evaluation using conventional techniques. The smears were stained, examined and then categorized as per the International System for Reporting Serous Cytopathology (ISRSFC). Cytological features were correlated with collected clinical data.

Results: As per the International System for Reporting Serous Fluid Cytopathology (ISRSFC), the data was represented with 324 (84.16%) as negative for malignancy, 24 (6.23%) were malignant, 22 (5.71%) were suspicious for malignancy, 13 (3.38%) showed atypia of undetermined significance, and 2 (0.52%) were non-diagnostic. Majority of samples belonged to the age group 40-49 years. There is clear predominance of females (male: female =1:1.16) in this study. Maximum number of samples (45.97%) was lymphocyte rich effusions. Chronic liver disease (alcoholic) with ascites was the most frequent clinical diagnosis (28.05%). The liver diseases collectively accounted for approximately 40% of the cases. Malignant and suspicious cytology was reported predominantly in middle-aged and elderly patients.

Conclusion: Majority of samples collected in this study were reported as benign with chronic liver disease being the leading underlying cause for ascites. The cytological reporting was done using the ISRSFC. Further, the cytological reports were correlated with the clinical findings which ultimately help in the appropriate patient management.

Keywords: Ascites, Peritoneal Fluid, Peritoneal Fluid Cytology, Clinicocytological Evaluation, Serous Fluid Cytopathology, Malignant Ascites, Reactive Mesothelial Cells, International System For Reporting Serous Fluid Cytopathology.

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Introduction

The accumulation of fluid within the peritoneal cavity is defined as ascites. The common causes for this common clinical condition can be chronic liver disease, tuberculosis, congestive cardiac failure, intra-abdominal malignancies etc. It is essential to identify the underlying cause of ascites for proper diagnosis and treatment [1]. Peritoneal fluid analysis includes gross, biochemical, microbiological and cytological examinations. Among these, cytological examination is most widely used because it is minimally invasive and relatively inexpensive [2]. Cytology plays a crucial role in distinguishing inflammatory from non-inflammatory conditions, atypical cells and identifying malignant cells [3]. Many of the studies have shown that benign effusions comprise the majority of peritoneal fluid samples, whereas malignant effusions comprise a relatively smaller

number [4-7]. Alcohol-related liver disease and chronic viral hepatitis contribute to chronic liver failure which is the most common cause of ascites [1]. The International System for Reporting Fluid Cytopathology (ISRSFC) classifies samples into: non-diagnostic (ND), negative for malignancy (NFM), atypia of undermined significance (AUS), suspicious for malignancy (SFM), and malignant (MAL) [8-11]. There is limited studies on the clinicocytological profile of peritoneal fluid from tribal-dominated regions of eastern India. Hence, this study adds valuable regional data to the already existing studies and help the clinicians to understand the disease pattern in this region. This study was done to evaluate the clinicocytological spectrum of peritoneal fluid samples received in Department of Pathology PJMCH, Dumka, Jharkhand, and to correlate cytological findings with the clinical diagnoses of patients.

Material and Methods

Study Design and Setting: This study is a prospective observational study. It was conducted in Department of Pathology, Phulo Jhano Medical College and Hospital, Dumka, Jharkhand, India. The overall time period was 24 months. The aim of this study is - evaluate the clinicocytological spectrum of peritoneal fluid samples and correlation of cytological findings with clinical diagnoses of patients with ascites.

Sample Size Calculation: Cochran's formula was used to calculate the sample size:

$n = Z^2pq/d^2$

Z=1.96 at a 95% confidence interval

p= expected prevalence (0.5)

q=1-p (0.5)

d= allowable error (0.05)

Hence, n=384.16 ~385

Inclusion Criteria

1. Patients with ascites who underwent diagnostic / therapeutic paracentesis.
2. Patients belonging to all age groups and sexes.
3. Patients with written informed consent.
4. Patients with adequate sample for cytological examination.

Exclusion Criteria

1. Patients who don't give consent.
2. Cases with incomplete clinical data.
3. Inadequate and poorly preserved samples.

Peritoneal fluids collected from the clinical departments were received in the Department of Pathology. Proper record was maintained. The gross features were noted. All samples underwent cytocentrifugation to enhance cellular yield [3]. Sediments were used to prepare smears and then fixed as per standard laboratory norms. Leishman and Papanicolaou stains were used to stain the smears to visualize the nuclear and cytoplasmic details [2,3]. The stained slides were examined under light microscopy. Cases were categorized as per International System for Reporting Serous Fluid Cytopathology (ISRSFC) into: non-diagnostic (ND), negative for malignancy (NFM), atypia of undetermined significance (AUS), suspicious for malignancy (SFM), and malignant (MAL) [8-11]. Correlations of cytological findings were done with the clinical findings and final clinical diagnoses. Data collected in this study were entered into Microsoft Excel and analysis was done on IBM Statistical Package for Social Sciences (SPSS) software. Descriptive analysis was done on the collected data and expressed in terms of frequencies, percentages and proportions. Chi-square test was applied to assess the association between categorical variables. A p-value of less than 0.05 was taken as statistically significant [12]. This study was approved from the Institutional Ethics Committee, Phulo Jhano Medical College and Hospital, Dumka. The ethical principles stated in Declaration of Helsinki were thoroughly followed [13]. The written informed consent was signed by all the participants.

Results

All the 385 samples collected were examined, reported and data was analyzed during the study period.

Distribution of Cytological Diagnoses: Out of 385 cases, majority of cases (324 cases, 84.16%) were diagnosed as negative for malignancy. In this study, as per cytomorphological features, we got two (0.52%) non-diagnostic (ND) cases, 13 cases (3.38%) reported as atypia of undermined significance (AUS), 22 cases (5.71%) with diagnosis of suspicious of malignancy and 24 (6.23%) malignant cases.

Table 1: Distribution of Cytological Diagnoses

Cytological Diagnosis	Number of Cases	Percentage (%)
Non-diagnostic (ND)	02	0.52
Negative for malignancy (NFM)	324	84.16
Atypia of undetermined significance (AUS)	13	3.38
Suspicious of malignancy (SFM)	22	5.71
Malignancy (MAL)	24	6.23
Total	385	100

Age and Sex Distribution: A total of 178 males and 207 females participated in this study. Male-to-female ratio of 1:1.16 was observed. Among different age groups, maximum cases belonged to the age group 40-49 years, i.e. 108 cases (28.05%), followed by the age group 50-59 years with 84 cases (21.82%). Least cases were reported in the age group 80-89 years with only 17 cases (4.42%).

Table 2: Age and sex distribution of Study Population

Age Group (Years)	Males	Females	Total
20–29	0	23	23
30–39	22	32	54
40–49	46	62	108
50–59	59	25	84
60–69	26	43	69
70–79	16	14	30
80–89	9	8	17
Total	178	207	385

Age-wise Distribution of Cytological Diagnosis: As per the International System for Reporting Serous Fluid Cytopathology (ISRSFC), all the sample reports were categorized into non-diagnostic (ND), negative for malignancy (NFM), atypia of undetermined significance (AUS), suspicious for malignancy (SFM), and malignant (MAL) [8-11]. Majority of cases (324 cases) were reported as negative for malignancy (NFM), among which highest number of cases (74) lies in the 50-59 years age group. Cases of malignancy (MAL), suspicious for malignancy (SFM) and atypia of undetermined significance (AUS) comprise of 24 cases, 22 cases and 13 cases respectively. Suspicious for malignancy and malignant cases were predominantly observed in middle aged and elderly patients. The youngest case reported as malignant was a 40 years old female whereas the oldest patient reported as suspicious for malignancy was 65 years old post radical mastectomy female.

Table 3: Age-wise Distribution of Cytological Diagnoses

Age Group (Years)	Non-diagnostic (ND)	Negative for malignancy (NFM)	Atypia of undetermined significance (AUS)	Suspicious for malignancy (SFM)	Malignant (MAL)	Total
20–29	0	22	1	0	0	23
30–39	0	52	2	0	0	54
40–49	1	89	3	7	8	108
50–59	0	74	2	0	8	84
60–69	1	43	3	15	7	69
70–79	0	29	2	0	0	31
80–89	0	15	0	0	1	16
Total	2	324	13	22	24	385

Sex-wise Distribution of Cytological Diagnoses: Out of all 385 patients, majority of cases are reported as negative for malignancy (NFM) which clearly shows female preponderance with 166 cases. Among a total of 177 male cases in this study negative for malignancy (NFM), malignant (MAL) and atypia of undetermined significance (AUS) comprise of 158 cases, 15 cases and 4 cases respectively.

Similarly among 208 female cases negative for malignancy (NFM), malignant (MAL), suspicious for malignancy (SFM) and atypia of undetermined significance (AUS) comprise of 166 cases, 24 cases, 22 cases and 13 cases respectively.

Table 4: Sex-wise Distribution of Cytological Diagnoses

Sex	Non-diagnostic (ND)	Negative for malignancy (NFM)	Atypia of undetermined significance (AUS)	Suspicious for malignancy (SFM)	Malignant (MAL)	Total
Male	0	158	4	0	15	177
Female	2	166	9	22	9	208
Total	2	324	13	22	24	385

Cytomorphological Findings: Majority of cases showed predominantly lymphocyte rich smears (177 cases, 46%). Second highest majority was shown by neutrophils rich smears (116 cases, 30%). Reactive mesothelial

cells was seen predominantly in 69 cases (18%) whereas 23 cases (6%) were predominantly showing atypical cells.

Table 5: Distribution of Predominant Cellular Populations

Predominant Cell Type	Number of Cases	Percentage (%)
Lymphocytes	177	45.97
Neutrophils	116	30.13
Reactive mesothelial cells	69	17.93
Atypical cells	23	5.97
Total	385	100

Clinical Correlation: This study shows the most common diagnosis from clinical departments for ascites in this region is alcoholic chronic liver disease accounting 108 cases (28.05%). The second most common diagnosis is congestive cardiac failure with 52 cases (13.50%). There were 22 cases in which clinical departments suspected malignancy and sent the ascetic fluid for examination. Chronic renal failure, non-alcoholic chronic liver disease, tubercular peritonitis, nephrotic syndrome and malignancy were the other diagnoses made by clinical departments.

Table 6: Clinical diagnoses and distribution of cases among patients presenting with ascites

Clinical Diagnosis	Number of cases	Percentage (%)
Chronic liver disease (alcoholic) with ascites	108	28.05
Chronic liver disease (non-alcoholic) with ascites	39	10.12
Congestive cardiac failure with ascites	52	13.50
Chronic renal failure with ascites	46	11.94
Nephrotic syndrome with ascites	23	5.97
Tubercular peritonitis with ascites	39	10.12
Suspicion of malignancy with ascites	22	5.71
Diagnosed malignancy with ascites	24	6.23
Ascites under investigation	32	8.31
Total	385	100

Discussion

In our study, majority of cases (324 cases, 84.16%) were cytologically diagnosed as negative for malignancy (NFM), whereas malignant (MAL), suspicious of malignancy (SFM), atypia of undetermined significance (AUS) and non-diagnostic (ND) accounts for 6.23%, 5.71%, 3.38% and 0.52% respectively. These findings are similar to the study conducted by Dowerah and Das, in which majority cases (85%) belonged to negative for malignancy group [4]. Similar findings were observed by Kumavat et al., who found non-neoplastic effusions as the most predominating group in their study [5].

The data in this study shows patients in the age group 40-49 years of age are in a clear majority. This explains that there is significant association between age and cytological diagnosis. Similar age-related findings were noted in the study conducted by Shikha NG, where peak incidence of ascites was seen in middle-aged population [6]. Slight female predominance was observed in this study, with male-to-female ratio 1:1.16. Male cases lead the malignant (MAL) effusion group whereas females lead rest of the groups (non-diagnostic (ND), negative for malignancy (NFM), atypia of undetermined significance (AUS), suspicious for malignancy (SFM). Karoo et al. also observed similar results having female predominance in their study [7].

In this study, approximately half of the cases (45.97%) have lymphocyte as the predominant cell which matches with the study done by Junaid et al. which reported lymphocyte-rich effusions in majority of ascetic fluid samples [14]. Lymphocyte rich effusions are generally seen in chronic inflammatory conditions, chronic liver disease, and tuberculous peritonitis, whereas, neutrophils-rich effusions are more common in secondary bacterial infections and spontaneous bacterial peritonitis.

Chronic liver disease due to alcohol is the most common clinical diagnosis in this study. It comprise of more than one-fourth of all the cases. Chronic liver disease unrelated with alcohol comprises 10.12% of the cases. Collectively, liver diseases accounted approximately 40% of all the samples evaluated in this study. This analysis is similar to the established literature showing that chronic liver disease and cirrhosis remain the leading cause of ascites worldwide [1].

Conclusion

In this study, benign effusions were in majority, with liver diseases (both alcoholic and non-alcoholic chronic liver diseases) representing almost 40% of the cases. From this we can draw a

conclusion that liver diseases are the most common underlying clinical condition for ascites. Malignant (MAL) and suspicious for malignancy (SFM) effusions were reported in middle-aged groups and elderly patients, hence there is need of proper cytomorphological evaluation in these groups. Lymphocytes are the major cellular population in most samples, while effusion fluids rich in neutrophils reflected secondary infectious processes. This study shows immense value of clinicocytological correlation in routine practices by presenting significant associations between age, sex and cytological diagnosis.

Peritoneal fluid cytology report provides valuable information when interpreted in conjugation with clinical findings. This help in accurate diagnosis, deciding treatment protocols and also improves patient care. The incorporation of the International System of Reporting Serous Fluid Cytopathology further enhances the diagnostic accuracy of this study.

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