

**A Study of Aetiopathological Profile of Peritoneal Fluid****Dr. Krupali Patel<sup>1</sup>, Dr. Naimish Patel<sup>2\*</sup>**<sup>1</sup>Tutor, Department of Pathology, Smt. NHL Municipal Medical College, Ellisbridge, Ahmedabad Gujarat, India<sup>2</sup>Associate Professor, GCS Medical College, Hospital & Research Centre, Near Chamunda Bridge, Naroda Road Ahmedabad, India**Original Research Article****\*Corresponding author***Dr. Naimish Patel***Article History***Received: 17.08.2018**Accepted: 27.08.2018**Published: 30.08.2018***DOI:**

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**Abstract:** The aspiration of peritoneal fluid is a bedside procedure. The routine, microscopic and cytological examinations of peritoneal fluid have been an important diagnostic value to find out the cause of ascites. The routine examination can help in differentiation of transudative and exudative fluid, microscopic examination, culture sensitivity and PCR testing can help to identify microbiological organism and cytological examination helps in the diagnosis and typing of malignancy in peritoneal fluid. The present study includes 110 cases of ascites. The aspiration of peritoneal fluid was done with aseptic precautions and fluid was submitted for routine and microscopy, cytological examination and ADA estimation. The transudate type of fluid detected in 46(41.8%) cases and exudative fluid detected in 64(58.2%) cases. The inflammatory fluid in 37(57.8%) cases and malignancy in 29(57%) case were detected and 8(12.5%) cases were suspicious of malignancy. Adenocarcinoma in male and carcinoma of ovary in female is commonest causes of malignancy. In case of malignant peritoneal fluid different cytomorphological features along with clinical and radiological findings help to locate the primary tumor in abdomen. The type of malignant lesion can be confirmed by histopathology after surgery or by various available biopsy techniques like laparoscopic and endoscopic biopsy. ADA level in body fluids is 93.5% specific and 95.9% sensitive for diagnosis of tuberculous peritoneal fluid and positive predictive value was 95.9% and negative predictive value was 92.1%. ADA level] than 40 IU/ML is diagnostic of tuberculous etiology of peritoneal fluid.

**Keywords:** Ascites Peritoneal fluid Cytology ADA.

**INTRODUCTION**

Abdominal swelling is a manifestation of numerous diseases. Ascites is one of the causes of abdominal distension. Ascites is due to numerous causes [1]. Abdominal paracentesis is a bedside procedure. The aspirated peritoneal fluid has been sent for different investigations due to its diagnostic value. The study has been conducted to assess different laboratory tests of peritoneal fluid and its value in etiology of the abdominal disease. The peritoneal fluid examination includes gross examination, routine and microscopic examination with different stains, ADA estimation and cytological examination. The routine examination is helpful in differentiate transudative fluid from exudative fluid while microscopic examination is important for detection of infective etiology while ADA estimation and cytological examination is useful for diagnosis of tuberculous and malignancy respectively. The study is organized to evaluate the examination of peritoneal fluid and its etiological, pathological and clinical correlations.

**MATERIALS AND METHODS**

Ascites is diagnosed by correlating clinical, ultrasonography of abdomen, CT abdomen and laboratory methods were used to differentiate malignant, tuberculous and others causes. In the present study the total 110 cases of peritoneal fluids were studied from indoor patients of tertiary care hospital Jamnagar, Gujarat. The routine, microscopic and sensitivity cytological examination was done in Department of Pathology in tertiary care hospital. All patients underwent abdominal paracentesis under aseptic conditions using 20 gauge needles which is least painful. Total 30 ml of peritoneal fluid were obtained for laboratory tests and cytological examination. The fluid specimen was examined within 2 hours of its withdrawal but on delay processing, the specimens were refrigerated. The routine examination of peritoneal fluid includes quantity of fluid, its appearance correlated with its color clear yellow-transudate, milky white or hemorrhagic and exudative fluid. Its turbidity was observed as in transudate is clear fluid and in the exudates the presence of turbidity due is to presence protein. The protein was measured by biuret method.

The transudate has <3.0g% of total protein. In exudative fluid has >3.0g% of total protein. The glucose was measured by glucose-oxidase- peroxidase method. In the peritoneal fluid the cell count was done in neubauer chamber as follows: in 0.38ml of WBC diluting fluid, 0.02ml of fluid was added and after allowing it to stand for 10mins, cells were counted using improved neubauer chamber in the entire ruled area. No. of cells were calculated as cells/ (mm)<sup>3</sup>.

Cytological examination: The smears were prepared from the sediment on to glass slide by a thin cotton swab applicator stick and immediately fixed in 95% ethyl alcohol, when the peritoneal fluid sample was rich in RBC's saline rehydration technique was used. In the present study, the slides were stained by Haematoxyline and Eosin (H & E), Periodic Acid Schiff (PAS), Mucicarmine, and Papanicolaou(PAP)

stain and were studied. In transudate, the smear showed less cellularity, few inflammatory cells and absence of malignant cells. In exudate, smear of malignancy and inflammation showed high cellularity with malignant cells and inflammatory cells respectively. In tuberculosis, mainly chronic inflammatory cells like lymphocytes and groups of epithelioid cells were seen. In malignancy high cellularity and presence of malignant cells having large pleomorphic nuclei and increase nuclear / cytoplasmic ratio were seen, cells in groups or clusters were seen. The various cytomorphological criteria were used for diagnosis and type of neoplasm and for determining the primary site of tumor. Technique of ADA estimation: Spectrophotometric method or the sensitive colorimetric method of Galanti and Guisti were used. The present study ADA values were collected from patients' data and calculation done as under.

**Table-1: The statistical analysis method for sensitivity and specificity of ADA estimation in peritoneal fluid:**

Test Results	Disease Present	Disease Absent
Test Positive	A	b
Test Negative	C	d

a = True Positive b = False Positive c = False Negative d = True Negative

$$\text{Sensitivity} = \frac{a}{a + c} \times 100 \quad \text{Specificity} = \frac{b}{b + d} \times 100$$

$$\text{Predictive value of positive test} = \frac{a}{a + b} \times 100$$

$$\text{Predictive value of negative test} = \frac{d}{c + d} \times 100$$

Sensitivity: Defined as ability of a test to detect disease when it is present true positive.

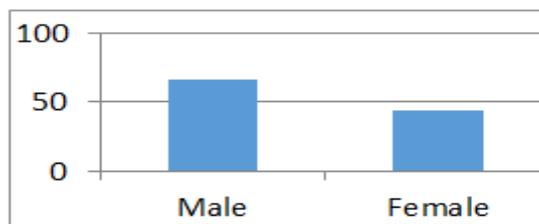
Specificity: Defined as ability of a test to exclude disease when it is not present

Cut –off: It is a point between disease and normality. Data analysis was done using Microsoft excel ver.2007 and SPSS ver. 12.

**RESULTS**

Chart 1 show that out of total 110 cases of ascites fluid, males (60%) were predominantly affected as compared to female (40%).

Table 2 shows that maximum cases of ascites were recorded in 5<sup>th</sup> and 6<sup>th</sup> decade of life.



**Chart-1: The gender incidence of ascetic fluid (n = 110):**

**Table-2: The age incidences of the peritoneal fluid cases:**

Sr. No.	Age of patient (Yrs)	Peritoneal fluid	%
1.	00-10	01	0.9%
2.	11-20	01	2.7%
3.	21-30	07	6.4%
4.	31-40	13	11.8%
5.	41-50	46	41.8%
6.	51-60	35	31.8%
7.	61 onwards	05	4.6%
TOTAL		110	100%

**Table-3: The naked eye examination of peritoneal fluid:**

Sr. No.	Gross examination	Peritoneal fluid Cases (%)
1.	Serous	63 (57.3%)
2.	Turbid	21 (19.1%)
3.	Purulent	00(00%)
4.	Hemorrhagic	26 (23.6%)
Total		110 (100%)

Table 3 shows that out of total 110 cases of ascites fluid 63(57.3%) were serous, 21(19.1%) were turbid and 26(23.6%) were hemorrhagic. Serous fluids were found to be transudates in most of the cases but

some were turning out exudative. While turbid fluids were suggestive of exudates and hemorrhagic fluid almost showed positive for malignant fluid.

**Table-4: The routine examination of peritoneal fluid:**

Sr. No.	Routine examination(transudate/Exudate)	No. of cases	Percentage
1.	Transudate (Protein<3.0g/dl)	46	41.8%
2.	Exudate (Protein>3.0g/dl)	64	58.2%
Total		110	100%

Table 4 shows that out of total 110 cases of ascetic fluid, 46(41.8%) were transudates and 64(58.2%) were exudates type.

Table 5 shows in case of ascetic fluid 37(57.8%) cases were inflammatory, 19(29.7%) were malignant and 08(12.5%) were suspicious of malignancy.

**Table-5: The cytological finding in peritoneal fluid:**

Sr. No.	Cytological examination	No. of ascites fluid(%)
1.	Inflammatory	37 (57.8%)
2.	Malignant	19(29.7%)
3.	Suspicious	08 (12.5%)
Total		64(100%)

**Table-6: The morphological pattern of various exudative peritoneal fluid**

Morphological patterns	No. of cases
Adenocarcinoma	22
Hepatocellular carcinoma	05
Lymphocyte rich effusion	26
Polymorph rich effusion	07
Reactive mesothelial cells	04
Total	64

Table 6 shows out of total 64 cases of exudative effusion, 22 cases of adenocarcinoma, 5 cases of hepatocellular carcinoma, 26 cases were lymphocyte

rich effusion, 7 cases of polymorph rich effusion and in 4 cases reactive mesothelial cell proliferation were seen.

**Table-7: The gender pattern in malignant peritoneal fluid.**

Sr. No.	Type of malignancy	Male	Female
1.	Carcinoma of ovary	0	14
2.	GIT malignancy	6	0
3.	Hepatocellular ca.	5	0
4.	Pancreatic carcinoma	2	0
Total		27	

It was observed that out of 27 cases of malignant peritoneal fluid, 14 cases were from females with carcinoma of ovary, 6 cases in males with GIT

malignancy, 5 cases were found in male with hepatocellular carcinoma and 2 cases of carcinoma of pancreas were found in male.

**Table-8: The distribution of total peritoneal fluids advised ADA estimation.**

Group code	Category of patients	Peritoneal fluid
A	Tuberculous etiology	26
B	Non tuberculous etiology	15
Total		41

Table 8 shows that 26 cases were of tuberculous peritoneal fluid and 15 cases of non-tuberculous peritoneal fluid.

Table 9 shows that most of patient of tuberculous fluid (26/41 63.6%) were in range of 31-70U/L of ADA, while for patients of non-tuberculous effusion, the range was between 11-30U/L of ADA, 15/41(36.5%) of patient fall in this category.

**Table-9: The distribution of observation according to ADA level in peritoneal fluids**

Range $\mu/L$	Tuberculous Peritoneal Fluid	Non tuberculous effusion peritoneal Fluid
00-10	-	02
11-20	-	07
21-30	-	04
31-40	02	01
41-50	08	01
51-60	10	-
61-70	05	-
71-80	01	-
>81	-	-
Total	26	15

**Table-10: No. of true positive and true negative cases according to cut off level (>40u/l) of ADA in peritoneal fluids**

ADA level	Tuberculous effusion	Non tuberculous effusion	Total
Positive cases(>40U/L)	24	01	25
Negative cases( $\leq$ 40U/L)	02	14	16
Total	26	15	41

As shown in table 10, 24 cases of tuberculous effusion were showing peritoneal fluid ADA level above 40U/L, considered as true positive cases and 2 patients were showing ADA level below 40U/L, considered as false negative cases. In non-tuberculous effusion cases were showing ascites fluid ADA level below 40U/L, that are true negative 14 cases and 1 cases

were showing ADA level above 40U/L considered as false positive cases. From these finding the sensitivity and specificity of test counted as follows. On checking association between ADA level with TB effusion and non TB effusion, it was found that there was a association between them and it was found statistically significant (Chi value- 143.02, df-1,  $p < 0.05$ ).

**Table-11: The sensitivity and specificity percentage of ADA value above 40U/ML is diagnosis of tuberculous peritoneal fluid**

Sensitivity	95.9%
Specificity	93.5%
Positive predictive value	95.9%
Negative predictive value	92.1%

On considering the 40U/L of fluid ADA level as cut off value sensitivity was 95.9%, specificity was 93.5%, positive predictive value was 95.9% and negative predictive value was 92.1%.

## DISCUSSION

Total 110 cases of peritoneal fluid were studied by routine examination and cytological

examination. ADA level were included in the present study. Age incidence as shown in table 12 below is comparable to previous studies. The commonest incidence of ascites was during 4<sup>th</sup> 5<sup>th</sup> and 6<sup>th</sup> decades of age because of causes of transudative, tuberculosis, and malignant is commonest in the same decades.

**Table-12: Peritoneal fluid: Age distribution**

Sr. No.	Author	No. of patient	Age range Years
1.	Hyman <i>et al.</i> [2]. (1963)	100	25-79
2.	Singh <i>et al.</i> [3]. (1969)	47	17-54
3.	Alexander <i>et al.</i> [4]. (1991)	71	27-83
4.	Garg <i>et al.</i> [5]. (1993)	89	30-70
5.	Sood <i>et al.</i> [6]. (1995)	44	25-69
6.	Present study (2012)	110	40-60

In the present study 66 cases (60%) were male patients. According to various authors, it is apparent that peritoneal is more common in males than females. The GI malignancy, tuberculous abdomen and chronic

alcoholic liver disease were more common in male than female. The results of present study are comparable with above mentioned results

**Table-13: The correlation of malignancy from other by cytological examination:**

Author	Year	Total no. of cases	Malignancy	Others
Cordozo <i>et al.</i> [7].	1966	344	199	145
Sears <i>et al.</i> [8].	1986	1165	423	742
Alexander <i>et al.</i> [9].	1991	48	14	34
Jha R <i>et al.</i> [10].	2006	93	28	65
Present study	2012	110	27	83

In present study of 110 cases of peritoneal fluid, 27 cases were diagnosed as malignant and other

83 cases were due to infectious etiology and transudative type.

**Table-14: The sensitivity and specificity at different cut off value of peritoneal fluid ADA of various authors and present study**

Sr. No	Authors	Year	Cut-off value of ADA(U/L)	Sensitivity	Specificity
1	Bharat kumar[11].	2010	40	92.8%	90%
2	Bina solanki[12].	1995	40	85%	100%
3	Present study	2012	40	95.9%	93.5%

As shown in above table the sensitivity and specificity of the test at cut off value > 40U/L were 95.9% and 93.5% respectively, this data is comparable with other studies.

**CONCLUSION**

The routine and cytological examination of peritoneal fluid has an important diagnostic value to find out the cause of peritoneal fluid. The routine examination can help in differentiation of transudative and exudative fluids and cytological examination helps in the diagnosis and typing of malignancy respectively. In case of malignant effusion different cytomorphological features along with clinical and radiological findings help to locate the primary tumor in abdomen. The type of malignant lesion can be confirmed by histopathology after surgery or by various available biopsy techniques like laparoscopic and endoscopic. The knowledge of cytology of peritoneal fluid is at greater help to the patients having inoperable malignancies where palliative treatment is needed and by avoiding unnecessary agony of surgery to the patients. The ADA level in peritoneal fluids is 93.5% specific and 95.9% sensitive for diagnosis of tuberculous ascites. Thus, a collective approach in body fluid analysis by physical, chemical, cytological method and special technique like cytopspin preparation and

special test like ADA level helps in making more accurate diagnosis than any single investigation.

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