ORIGINAL RESEARCH

# Ascitic Fluid and Serum Cholesterol, Triglyceride and Protein in ascites of Liver Cirrhosis, Tuberculosis and Malignancy

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## ABSTRACT

**Introduction**: Ascites defined as a pathological accumulation of fluid in the peritoneal cavity is the initial manifestation of many systemic diseases. Conventional biochemical tests and cytology still pose a diagnostic dilemma in a large number of patients. We determined the levels of cholesterol, triglyceride and proteins in the ascitic fluid and serum of patients with ascites due to liver cirrhosis, abdominal tuberculosis and malignancy to find out whether these parameters could be used as tests in differentiating ascites due to the above mentioned causes.

**Material and Methods:** This was a prospective study on 30 patients of ascites admitted in the medical and surgical wards of our institution between August 2014 and July 2015. Serum and ascitic fluid total protein, albumin, cholesterol and triglyceride levels were measured as were the serum ascitic albumin, protein, cholesterol and triglyceride gradients.

**Results:** Serum ascites albumin gradient was higher in liver cirrhosis as compared to tuberculous and malignant ascites and this difference was highly significant ($P$ <0.001 in each). Serum and ascitic fluid triglyceride gradient was higher in malignant ascites as compared to that observed in liver cirrhosis and tuberculosis, the difference was statistically significant ($P$ <0.01). Highest levels of serum cholesterol were recorded in malignant ascites.

**Conclusion:** Serum ascites albumin gradient is a good marker to differentiate between ascites due to liver cirrhosis and tubercular or malignant ascites. Serum and ascitic fluid triglyceride gradient and serum cholesterol levels are higher in malignancy as compared to tuberculosis or liver cirrhosis.

**Keywords:** Ascites, Ascitic fluid, Serum cholesterol, triglyceride, protein

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**Conflict of Interest:** None

## INTRODUCTION

Ascites due to liver cirrhosis, tuberculosis and malignancy is a very common clinical problem.[1] Distinction between the three using conventional parameters is at times very difficult due to considerable overlap. Lactate dehydrogenase, glucose concentration, fibrinogen degradation products have all been investigated but none provides a complete distinction between the various types of ascites.[2] A high ascitic fluid protein level although a constant finding in malignant ascites has also been reported in upto 25% patients with chronic liver disease.[3] Cytological examination despite its high specificity is unreliable as its sensitivity is only 60%.[4] The present study was therefore undertaken to determine the ascitic fluid and serum levels of cholesterol, triglyceride and proteins in patients with liver cirrhosis, tuberculosis and malignancy and to determine whether they had any diagnostic value in differentiating ascites from the above causes.

## MATERIAL AND METHODS:

The present study was a prospective observational study conducted on 30 patients of ascites admitted in the indoor medical and surgical wards between the period August 2014 – July 2015. Due permission was taken from the hospital ethical committee to carry out this study. Only patients of liver cirrhosis, tuberculosis and malignancy were included in this study. They were divided into three groups. The diagnostic criterias were as follows: Liver Cirrhosis: Patients with a history of jaundice and alcoholism. Deranged liver function tests and ultrasound confirmation of the same. Abdominal tuberculosis: History of pulmonary tuberculosis, positive Mantoux test, raised adenosine deaminase in ascitic fluid and biopsy revealing granulomas and AFB. Malignancy: Primary malignancy isolated elsewhere in the body, cytology showing malignant cells, peritoneal biopsy positive for malignancy. All patients underwent ultrasound guided abdominal paracentesis and simultaneously a 3ml of venous sample was also drawn out for total protein, albumin, triglyceride and cholesterol estimation. All patients in addition also had a complete blood count, Liver function tests, plain X-ray chest PA view, adenosine deaminase in ascitic fluid. Estimation of total proteins was done by the Biuret method (Henry et

al.,1974),[5] Albumin levels by the BCG method suggested by (Doumas et al,1971)[6] Cholesterol estimation by the enzymatic method(Allain.1974 )[7] and Triglyceride by the enzymatic method (Eggstein et al. 1974).[8] All the data was entered into a specifically designed proforma for this purpose.

## STATISTICAL ANALYSIS

Data represented as frequencies,range, mean, standard deviation was processed in MS EXCEL and statistically analyzed by unpaired Student't' test. A two tailed probability value of $< 0.05$ was taken as indicating significance.

## RESULTS

The commonest cause of ascites was liver cirrhosis (53.4%) followed by malignancy (26.6%) and tuberculosis (20%). Liver cirrhosis was common in the age group 41-50 years, tubercular ascites in the age group 21-30 years and malignant ascites was common in the age group 61-70 years (Fig. 1). The values of ascitic fluid protein in tuberculous ( 4.3 ± 1.54g/dl ) and malignant ascites ( 3.72 ± 1.47g/dl) was higher than in liver cirrhosis ( 1.56 ± 0.17 g/dl) and this was statistically significant ( $P$ <0.01 ), however no significant difference in the ascitic fluid total protein and albumin existed between malignant and tubercular ascites. The ascitic fluid cholesterol in tubercular (81.83 ± 29.32mg/dl) and malignant ascites (93.25 ± 41.90mg/dl) was higher than in liver cirrhosis (35.12 ± 6.35mg/dl) and significantly so ($P$ <0.01). Ascitic fluid triglyceride levels were also higher in malignant and tubercular ascites as compared to liver cirrhosis. The corresponding values being 85.12 ± 34.92mg/dl, 68.50 ± 20.08mg/dl and 51.25 ± 26.61mg/dl ( $P$ <0.05) (Table1). Serum total protein levels showed no difference ( $P$ >0.05 ) with values within normal limits i.e. 6.6-8.3g/dl in all three groups. Higher levels of serum cholesterol ( 162.6 ± 39.66mg/dl) were recorded in patients of malignant ascites which was significantly different from tubercular ascites ( 116.5 ± 15.66mg/dl, $P$ <0.05) and liver cirrhosis (120.25 ± 35.86mg/dl, $P$ <0.05). Serum triglyceride ( 172 ± 51.99mg/dl) was higher in malignant ascites as compared to tubercular patients ( 114.8 ± 16.24mg/dl, $P$ <0.05) and those with cirrhosis ( 98.87mg/dl, $P$ <0.01)(Table2). Serum and ascitic fluid gradient of albumin in liver cirrhosis ( 1.53 ± 0.001g/dl) was significantly higher as compared to tubercular abdomen ( 1.07 ± 0.18g/dl) and malignancy (1.03 ± 0.28g/dl), $P$ <0.001 in both cases. Serum and ascitic fluid cholesterol gradient was highest in cirrhosis ( 85.12 ± 29.51mg/dl) as compared to malignant (69.37 ± 2.23mg/dl) and tubercular (34.67 ± 13.66mg/dl) patients. Serum and ascitic triglyceride gradient in malignancy (72 ± 17.07mg/dl) when compared to liver cirrhosis (47.62 ± 8.39mg/dl) and tuberculosis (46.33 ± 3.84mg/dl) was significantly higher ($P$ <0.01) (Table 3).

| S. No. | Groups | Total Protein (gm/dl) Mean | Albumin (gm/dl) Mean | Cholesterol (mg/dl) Mean | Triglyceride (mg/dl) Mean |
|---|---|---|---|---|---|
| 1 | Tuberculosis | 4.30 | 1.98 | 81.83 | 68.50 |
| 2 | Malignancy | 3.72 | 1.86 | 93.25 | 85.12 |
| 3 | Liver cirrhosis | 1.56 | 0.92 | 35.12 | 51.25 |
| | | | | | |
| | 1 vs 3 | p<0.01 | p<0.01 | p<0.01 | p>0.05 |
| | 2 vs 3 | p<0.01 | p<0.01 | p<0.01 | p<0.05 |
| | 1 vs 2 | p>0.05 | p>0.05 | p>0.05 | p>0.05 |

**Table-1:** Ascitic fluid protein, albumin, cholesterol, triglyceride

| S. No. | Groups | Total Protein (gm/dl) Mean | Albumin (gm/dl) Mean | Cholesterol (mg/dl) Mean | Triglyceride (mg/dl) Mean |
|---|---|---|---|---|---|
| 1 | Tuberculosis | 7.35 | 3.06 | 116.5 | 114.8 |
| 2 | Malignancy | 6.9 | 2.90 | 162.6 | 172.0 |
| 3 | Liver cirrhosis | 6.67 | 2.46 | 120.25 | 98.87 |
| | | | | | |
| | 1 vs 3 | P>0.05 | P<0.05 | P>0.05 | P>0.05 |
| | 2 vs 3 | P>0.05 | P<0.05 | P<0.05 | P<0.01 |
| | 1 vs 2 | P>0.05 | P>0.05 | P<0.05 | P<0.05 |

**Table-2:** Serum total protein, albumin, cholesterol, triglyceride

| S. No. | Groups | Serum Ascites albumin gradient (g/dl) | Serum Ascites cholesterol gradient(mg/dl) | Serum ascites triglyceride gradient(mg/dl) |
|---|---|---|---|---|
| 1 | Tuberculosis | 1.07 ± 0.18 | 34.67 ± 13.66 | 46.33 ± 3.84 |
| 2 | Malignancy | 1.03 ± 0.28 | 69.37 ± 2.23 | 72 ± 17.07 |
| 3 | Liver cirrhosis | 1.53 ± 0.001 | 85.12 ± 29.51 | 47.62 ± 8.39 |

**Table-3:** Serum to ascitic fluid gradient of albumin, cholesterol and triglyceride

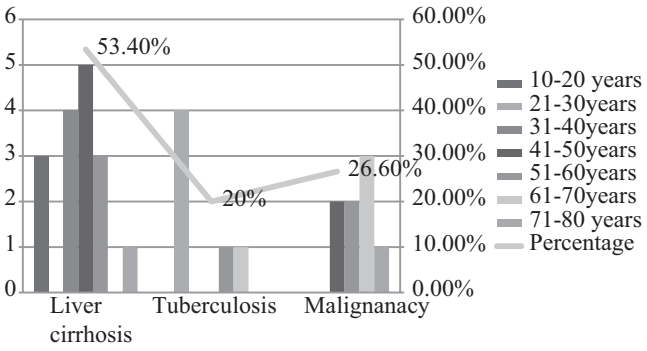


**Figure-1:** Showing percentage of patients and age groups in liver cirrhosis, tuberculosis and malignancy

## DISCUSSION

The present study was undertaken on thirty patients with ascites due to liver cirrhosis, tuberculosis and malignancy. The levels of serum and ascitic fluid cholesterol, triglyceride and protein were measured in all of the patients to determine whether they had any diagnostic value in these patients of ascites of varied etiology. Liver cirrhosis (53.4%) was the commonest etiology of ascites followed by malignancy (26.6%) and tuberculosis (20%). Similar findings have been reported in a study from Lahore.[9] The values of ascitic fluid protein in tuberculous ( 4.3 ± 1.54g/dl ) and malignant ascites ( 3.72 ± 1.47g/dl) was higher than in liver cirrhosis ( 1.56 ± 0.17 g/dl) similar findings were reported by Anita Bijoor[10] who reported a mean value of total protein in malignant ascites as 4.22 ± 0.68g/dl and 1.09 ± 0.45g/dl in liver cirrhosis. The ascitic fluid cholesterol in tubercular (81.83 ± 29.32mg/dl) and malignant ascites (93.25 ± 41.90mg/dl) was higher than in liver cirrhosis (35.12) findings similar to those of Sachin Inglel[11] who found values of 70mg/dl diagnostic of malignant ascites. The cause of elevated fat content in early peritoneal carcinomatosis is lymphatic obstruction causing exudation of lymph with a relatively high fat content.[12] Serum and ascitic fluid gradient of albumin in liver cirrhosis was significantly higher as compared to tuberculosis and malignancy and can be used as diagnosis for the same a fact corroborated in many other studies.[13] Serum and ascitic triglyceride gradient in malignancy was significantly higher than in tuberculosis and cirrhosis also seen in other studies.[14]

## CONCLUSION

Serum ascites albumin gradient is a good marker to differentiate between ascites due to liver cirrhosis and tubercular or malignant ascites. Serum and ascitic fluid triglyceride gradient and serum cholesterol levels are higher in malignancy as compared to tuberculosis or liver cirrhosis.

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