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A Study of 150 Cases of Ascites: Etiology and Diagnostic Evaluation

Dr. Adwait B. Patel[1], Dr. Akash J. Patel[2], Dr. Manish B. Patel[3]

[1]MBBS (Medical Officer)
[2]MBBS (Resident)
[3]MD (Senior Professor of Medicine and Superintendent)
Sheth V.S. General and Sheth C.M. Hospital, Smt. N.H.L Municipal Medical College, Ellisbridge, Ahmedabad - 380006, India

Corresponding Author:

Dr. Adwait B. Patel

7-B, Amulakh Society, Kashiba Road, Ranip, Ahmedabad- 382480, India

Contact No: +91 9601128877

Email: pateladwait[at]gmail.com

Abstract: ***Aim: The aim of this study was to evaluate socio-epidemiological data on the etiological profile of ascites in adults in a tertiary care hospital in Ahmedabad, Western India, and to compare the study with other developing countries. Knowledge of the causes also allows discussing the preventive measures. Materials and Methods: A hospital-based observational study was conducted in the Department of Medicine in a tertiary care center in Gujarat, located in the Western India. In all 150 patients who were diagnosed as ascites on the basis of history, physical examination, ultrasonography, CT scan or MRI and ascitic fluid aspiration and cytology etc. were performed according to requirement. Cases of more than 18 years of age were included in the study. Data was analyzed and presented in a comparative study manner. Results: Cirrhosis of liver was the leading cause of ascites in our study (58.9%), tuberculosis was the second most common cause of ascites (14.1%), malignancy and cardiac disorders were the third (15.3%) most common causes for ascites. Alcohol was the leading cause of cirrhosis in 64 patients (72.7%). Conclusion: Liver cirrhosis due to alcoholism and tuberculosis were the major causes of ascites in our study while liver cirrhosis due to chronic viral hepatitis infections (hepatitis B (HBV) and C (HCV) viruses) and cardiac failure were the main causes of ascites in other developing countries. The other major causes included heart failure, renal failure, malignancy etc. It is wise to consider and give priority to these diseases whenever one is evaluating a patient with ascites. The measures on taking care of preventable risk factors are desired.***

Keywords: Ascites, cirrhosis, Peritoneal Tuberculosis

1. Introduction

Ascites (Greek origin -askos, means bag or sac) describes the condition of pathologic fluid collection within the abdominal cavity.[1] Ascites formation is the result of a series of anatomical, pathophysiological, and biochemical changes. The specific causes of ascites can be divided into those associated with portal hypertension (cirrhotic ascites) and those unrelated to portal hypertension (noncirrhotic ascites). In patients with liver cirrhosis, ascites develops as a consequence of sinusoidal portal hypertension, which results in alterations to capillary pressure, permeability and accumulation of retained fluid in the abdominal cavity. This mechanism of fluid accumulation is known as transudation. The passage of high molecular weight substances is limited because capillary damage is not the underlying process in transudation. Another mechanism of ascites formation is known as exudation; ascites development is secondary to increased vascular permeability due to the inflammatory process, tumoral invasion, or traumatic damage to the peritoneum or intraperitoneal organs.

Ascitic fluid may accumulate rapidly or gradually depending upon the cause. Mild ascites may not produce any symptoms. Moderate ascites may just produce an increase in abdominal girth and weight gain. Large amounts of fluid can produce abdominal discomfort and the appearance of hernias particularly umbilical hernia and hinder the mobility of the patient. Ascites can be the first sign of liver disease. Thus, it is important to obtain a history of risk factors for a liver disease like alcohol consumption, drug abuse, blood transfusions, or hepatitis in the past. The sudden development of ascites in a previously stable patient of cirrhosis should raise the suspicion of hepatoma.

The differential diagnosis of ascites remains a problem in clinical practice. Treatment decisions are directed according to the etiological profile. Diagnostic paracentesis has become increasingly important as the key initial investigation in the assessment of ascites.[2] Cirrhosis is the leading cause of ascites in both developed and developing countries. Tuberculosis is the second most common cause in resource limited nations in comparison to resource rich where peritoneal malignancy follows cirrhosis.[3] Tuberculosis is seen in 30% of the patients with ascites in India.[4] Peritoneal tuberculosis leads to ascites in only 2% cases in the Western world. Epidemiological data on the etiological aspects of ascites are insufficient from this region and has not yet been reported. Therefore, this study was planned and conducted in a tertiary care hospital providing gastroenterology services in Ahmedabad, Gujarat, India.

2. Material and Methods

The present study is purely computerized data analysis of 150 cases of Ascites for etiological analysis.This is a descriptive observational study was carried out at the Medicine Department, Sheth VS General and Sheth C.M. hospital, Ahmedabad, Gujarat, a leading tertiary health care center which receives patients from almost all regions of Gujarat and other western states of India.

All indoor patients who were diagnosed as ascites on the basis of history, physical examination, ultrasonography, and of age >18 years were included in the study after getting the informed consent. The patients included in the study were evaluated by detailed history. Questionnaires regarding risk factors were included in history which included: Alcohol history including amount and duration of alcohol intake, blood transfusion, surgery, needle prick, tattoo, and high-risk behavior. Ascitic fluid was analyzed for biochemistry, cytology, gram staining, acid fast bacillus staining, malignant cells, culture, and sensitivity. Serum-ascites albumin gradient (SAAG) and adenosine deaminase (ADA). Detailed investigations for specific etiologies were carried out in these cases. Serological markers such as antinuclear antibodies, an antibody against liver-kidney-microsomes, antismooth muscle antibodies, immunoglobulin A, tissue transglutaminase antibody were done on the basis of clinical profile, and for differential diagnosis serum ceruloplasmin, urinary copper levels and slit lamp examination, ultrasound abdomen and computed tomography if the ultrasound was inconclusive - were carried out. Severity of disease was done according to Child-Turcotte-Pugh (CTP) score in cirrhosis patients. The study was approved by the Institutional Ethics Committee.

Available computerized detailed information was collected regarding demographic and epidemiologic parameters such as age, gender, etiology, etc and comparative analysis done with other studies of developing countries.

3. Results

Table 1: Socio-demographic characteristics of Study participants

Factor		Present Study Frequency (n-150)	Oumer A. M. et al [16] Frequency (n-52)
Age	18-35	37 (24.7%)	16 (30.8%)
	36-50	81 (54%)	24 (46.2%)
	51-65	27 (18%)	9 (17.3%)
	>66	5 (3.3%)	3 (5.7%)
Sex	Male	96 (64%)	30 (57.7%)
	Female	54 (36%)	22 (42.3%)
Residence	Urban	99 (66%)	7 (13.5%)
	Rural	51 (34%)	45 (86.5%)

The present study is compared with a study conducted at University of Gondar Hospital, Northwest Ethiopia. The age group of study population ranged from 20 years to 85 years and the mean age was 51.5 years in present study compared to the mean age of 43.8 (± 14) in the study at University of Gondar Hospital, Northwest Ethiopia.

Table 2: Gender Distribution – Various etiologies of Ascites

Etiology	Male (96)	Female (54)
Cirrhosis	70 (72.9%)	20 (37.0%)
Tuberculosis	15 (15.6%)	6 (11.1%)
Malignancy	3 (3.1%)	9 (16.7%)
Cardiac	5 (5.2%)	8 (14.8%)
Renal	2 (2.0%)	9 (16.7%)
Inconclusive	1 (1.0%)	2 (3.7%)

In our study of 150 cases of ascites, the male to female ratio was 1.77:1. A total of 102 (68.0%) patients were in the age group of 41–70 years. The causes of ascites observed with their frequency are as shown in **Table 2** in our study.

Table 3: Etiology of Ascites

Etiology	Present Study Total (150)	Oumer A. M. et al [16] Total-52
Cirrhosis	88 (58.9%)	24 (46.1 %)
Tuberculosis	21 (14.1%)	6 (11.5%)
Malignancy	11 (7.2%)	6 (11.5%)
Cardiac	12 (8.1%)	10 (19.2%)
Renal	10 (6.4%)	3 (5.8%)
Hepatosplenic Schistosomiasis	0	6 (11.5%)
Inconclusive	8 (5.3%)	3 (5.8%)

Alcohol was the leading cause of cirrhosis in 72.7% cases, hepatitis B was the cause in 11.8%, and hepatitis C was the cause of cirrhosis in 1.2%. Alcohol and hepatitis B was the cause in 2.3%, and hepatitis C and alcohol was the 1.5%. 3.3% had autoimmune cirrhosis and six patients had cryptogenic cirrhosis (4.0%). Of 88 patients of cirrhosis, high SAAG (>1.1 g/dl) was observed in 94.4% patients and 5.4% patients had low SAAG (<1.1 g/dl). Two patients had a high SAAG with high protein (ascitic albumin >2.5 g/dl) and all had ADA >40. Of 88 patients of cirrhotic ascites, 67 patients (74.4%) had lymphocytes as predominant cells and 23 patients (25.6%) had neutrophils as predominant cells. Of 90 patients of cirrhotic ascites, a total of 31 (34.4%) patients had peritoneal fluid infection. Among these 31 patients, 14 patients (45.2%) had culture positive SBP, 16 patients (51.6%) had culture negative neutrophilic ascites. Hepatosplenic Schistosomiasis is uncommon in India.

Among the culture, positive 11 patients had *Escherichia coli* on the culture of ascitic fluid, 2 patients had *Enterococcus* and 1 patient had *Klebsiella Pneumoniae.* In addition, 2 (2.2%) patients of cirrhosis had evidence of mixed ascites in the form of tubercular peritonitis. Among ascitic fluid cytology for malignant cells was positive in 11 (7.2%) patients. Among them, 7 patients (63.6%) had ovarian carcinoma. There was **one** patient of non-Hodgkin's lymphoma, who was diagnosed with ascitic fluid cytology. Among 21 patients of tubercular ascites, 3 (14.3%) patients had acid-fast bacteria (AFB) positive on Ziehl–Neilson's staining. The mean age of patients with tuberculosis was 45.5 years. Among the 12 patients with cardiac ascites, 3 had dilated cardiomyopathy, 8 had cor pulmonale, and 1 each had hypertensive heart disease and pericarditis. Among the 10 patients with renal cause of

ascites, 7 had chronic renal failure and 3 had nephrotic syndrome.

4. Discussion

Etiology of ascites can be suspected from history and examination, but ascitic fluid analysis is an important investigation to diagnose the cause. In the United States, cirrhosis of liver is the most common cause of ascites (85%), followed by non-hepatic causes such as cardiac failure (3%) and peritoneal malignancy (2%). Approximately 5% of patients with ascites have two or more causes of ascites formation, that is, "mixed" ascites. Usually, these patients have cirrhosis plus one other cause, e.g., peritoneal carcinomatosis of peritoneal tuberculosis.[10] The majority of patients who present with ascites have underlying cirrhosis, with the remainder being due to malignancy, heart failure, tuberculosis, pancreatitis, and other rare causes.[2]

In India, cirrhosis of liver is the most common cause of ascites (55%) followed by tuberculosis (30%).[4] Males constituted the predominant number of our patients due to the sociocultural reasons of liquor consumption. In our study, we found that ascites due to cirrhosis of liver constituted the largest group and 73.5% of them were alcohol related. The results are comparable to other studies.[11] Our study is comparable to the published data though the total percentage of patients with cirrhosis and ascites is less in our study as compared to the Western literature. This is because tuberculosis is more prevalent in developing countries which contribute a good amount of patients with ascites.

According to a study conducted in Pakistan among 50 patients with ascites, cirrhosis was the commonest cause contributing to 80% (40 patients) of the cases. The remaining causes were chronic renal failure 10%, peritoneal malignancy 4%, cardiac failure 2%, and peritoneal tuberculosis 4%. In this study 58% (29 patients) were female. Among the cirrhotic patients, hepatitis C infection contributed 80% while hepatitis B was seen in 12.5% of patients. Alcoholic liver disease was not reported as a cause. One patient had hepatocellular carcinoma [13].

In prospective study, conducted at Ibadan, Nigeria, among ninety adult patients with ascites, 40 (44%) had liver cirrhosis, 21 (23%) had tuberculous peritonitis, 20 (22%) had malignant ascites, 5 (6%) had heart diseases, and 4 (5%) had nephrotic syndrome [14].

Among patients with cirrhotic ascites 45.2% patients were found to have SBP. The frequency of SBP among hospitalized patients with advanced cirrhosis varies from 10% to 30%.[5] *E. coli* was the most common organism isolated on culture and is consistent with the literature.[6] In our study, tuberculosis is the second most common cause of ascites which is comparable to other developing countries and was observed in 14.1 % of patients. Zeil–Neilson's staining yielded AFB positivity in 10% patients. Peritoneal tuberculosis accounts for 0.5–1% of all tuberculosis related hospital admissions with an overall mortality rate of 7%.[7] In India 10% patients with abdominal tuberculosis present with ascites.[6] The yield of organisms on smear and culture is low. Staining for acid fast bacilli is positive in <3 percent of cases.[8] Tuberculous infection of the peritoneum is rare in developed countries but not infrequent in countries with a high prevalence of TB.[9] It is commonly seen in individuals <40 years of age. The patients with tubercular ascites had a mean age of 45.5 years which is lower than the cumulative mean age of 51.5 years.

In a research conducted by Krastev et al. at 2013 among 167 patients with cirrhosis and ascites 25 patients had SBP and 22 patients had secondary bacterial peritonitis [15].

Tuberculous peritonitis often exhibits female predominance. Individuals with HIV infection, cirrhosis, diabetes, malignancy, and those receiving continuous ambulatory peritoneal dialysis are at high risk for tuberculous peritonitis. Mixed ascites was observed in 2.2% of patients. All patients had features of underlying cirrhosis and peritoneal tuberculosis. Peritoneal tuberculosis in the presence of hepatic cirrhosis is not only a diagnostic problem but a therapeutic challenge also. In a patient of compensated cirrhosis suspect tubercular ascites if the patient decompensates or if ascites increases or is resistant ascites despite adequate diuretic treatment and sodium restriction. Symptoms of tubercular activity in the form of anorexia, fever, weight loss are helpful. Tubercular ascites in the setting of cirrhosis reveals a high SAAG, high protein ascites with a lymphocytic predominant high cell count fluid. Peritoneal fluid ADA has a sensitivity of 100% and specificity of 97% for making a diagnosis of tubercular ascites. The optimal cut-off value defined is 39 IU/L.Treatment of tuberculosis in patients with underlying cirrhosis is a challenge because of the compromised liver functions and high risk of hepatotoxicity. Malignant ascites was observed in 7.2% of cases in this study. Malignant ascites accounts for approximately 10% of all cases of ascites. Ovarian carcinoma is the most common cause of malignant ascites in our region and the second most common cause is gastrointestinal malignancy. Malignant ascites is a sign of peritoneal carcinomatosis, the presence of malignant cells in the peritoneal cavity. Tumors causing carcinomatosis are more commonly secondary peritoneal surface malignancies which include: Ovarian, colorectal, pancreatic, and uterine; extra-abdominal tumors originating from lymphoma, lung, and breast; and a small number of unknown primary tumors.[12]

The advantages of this study are that the causes of ascites in this region were known which help us in directing treatment decisions and predicting the outcome. Focus on primary prevention by abstaining from alcohol consumption, prevention and proper treatment of tuberculosis and other preventable causes. Preventive BCG and hepatitis B vaccination are the measures recommended.

5. Conclusion

In conclusion, liver cirrhosis due to alcoholism and tuberculosis are the major causes of ascites in our study

while liver cirrhosis due to chronic viral hepatitis infections (hepatitis B (HBV) and C (HCV) viruses) and cardiac failure are the main causes of ascites in other developing countries. The other major causes included heart failure, renal failure, malignancy etc. It is wise to consider and give priority to these diseases whenever one is evaluating a patient with ascites.

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Ethical Approval

This study was approved by the review board of our institute.

Consent

Oral informed consent was obtained from each patient.

Declaration:

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