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A Study on Clinical Outcomes and Trends of Ascites in Tertiary Healthcare

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ABSTRACT

Ascites is the accumulation of abdominal fluid in the peritoneal cavity. Liver cirrhosis, Intra-abdominal malignancy, tuberculosis are the major etiologies of ascites. In our context, etiology behind ascites and its correlation with symptoms and its complications are not yet studied, so the present study is conceptualised to evaluate the clinical profile of ascites. The aim of the present study was to observe the prevalence, clinical management and the assessment of complications associated with ascites in hospitalized patients, offering insights into contemporary ascites management and outcomes. It was a prospective Observational Study conducted at a tertiary care hospital of Hyderabad over 6 months studied in 113 patients with ascites. All patients who fulfilled the inclusion criteria of above 18 years and ascites confirmed by clinical and ultrasound examination were thoroughly evaluated with a detailed history, physical examination and appropriate investigations. The predominantly male (83%) patient population exhibited liver cirrhosis (27%) as the primary cause, followed by alcoholic liver disease (23%) and portal hypertension (17%). Abdominal distension (24%) and hepatic encephalopathy (35%) were prevalent symptoms. Laboratory analysis revealed transudative ascitic fluid in most cases (10% with SAAG values >1.1 mg/dl), prevalent hyponatremia (up to 50% in cirrhosis and ascites patients), hyperkalemia (1.6%) and anaemia (7%). Management primarily involved diuretics (23%) and human albumin transfusions (19%). The study highlights early detection and comprehensive management including liver transplantation consideration for eligible patients, as pivotal for improved outcomes and reduced morbidity and mortality. Emphasizing a multidisciplinary approach, this study underscores the necessity of vigilant monitoring, appropriate fluid handling, and collaborative efforts among medical specialties in ascites management.

Keywords: Ascites, Abdominal Cavity, Liver Cirrhosis, Malignancy, Transudative, SAAG, Exudative, Hyperkalemia.

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INTRODUCTION

Ascites is an abnormal accumulation of fluid in the peritoneal cavity, often exceeding 1 liter, arising from various disease states ^[1]. Liver cirrhosis accounts for 75% of cases, with other causes including malignant tumors, heart failure, tuberculosis, and pancreatitis ^[2]. Ascites can be linked to portal hypertension (cirrhotic ascites) or be independent of it (non-cirrhotic ascites) ^[3]. Ascites has various other causes such as intrahepatic and extrahepatic portal hypertension, low albumin levels and specific diseases like pancreatic and bile ascites (non- Peritoneal causes), malignant peritoneal mesothelioma and peritoneal cancer (peritoneal causes)^[4]. Ascites develops by portal sinusoidal hypertension which leads to altered capillary pressure and permeability in the peritoneum, resulting in fluid accumulation via transudation or exudation mechanisms ^[5, 6]. In cirrhosis, increased intrahepatic vascular resistance results also from an imbalance between vasodilators and vasoconstrictors.

Ascites that develops slowly may go unnoticed in its milder forms, which can have no symptoms. As it progresses to a moderate stage, ascites accelerate weight gain and waist circumference. In severe cases, huge fluid can accumulate and cause discomfort in the abdomen, limit mobility, and result in hernias, particularly umbilical hernias. If ascites appears suddenly who has previously been stable, it may be an indication of other underlying conditions like cancer, tumor infiltration, peritoneal trauma, or damage to other intra-abdominal organs. Patients may present with abdominal distension, weight gain, weakness, and shortness of breath due to fluid accumulation ^[7]. Other symptoms include back discomfort, heartburn, changes in bowel habits, and swollen limbs ^[8]. Patients with advanced liver disease may exhibit various symptoms such as jaundice, muscle wasting, and gynecomastia. Additionally, spontaneous bacterial peritonitis (SBP) can lead to fever, abdominal tenderness, and confusion. Those who have ascites related to cardiac illness such as dyspnea, orthopnea, and peripheral edema. Recognizing the specific symptoms and causes of ascites is essential in diagnosing and treating the underlying condition effectively.

Ascites diagnosis involves a comprehensive medical history, physical examination which shows gradual rise in the dimensions of their abdomen, paracentesis, and ascitic fluid analysis, including SAAG calculation to differentiate portal hypertension-related ascites ^[9]. Ascitic fluid protein and albumin are measured with the serum albumin level to calculate the serum-ascites albumin gradient (SAAG). This diagnostic approach helps healthcare providers more accurately identify and treat this condition. If the gradient of ascitic fluid is >1.1 g/dL, it is highly indicative of portal

hypertension in the patient, with a 97% accuracy rate. If the gradient is below 1.1 g/dL, it suggests the absence of portal hypertension. Healthcare providers may perform liver biochemical testing, measure serum albumin levels, and assess prothrombin time (PT) or INR levels. Additionally, measuring serum amylase and lipase levels can help identify the possibility of acute pancreatitis in the patient. When diagnosing ascites, one important test to consider is measuring the amylase levels in the ascitic fluid. An amylase level greater than 1000 U/L may suggest the presence of pancreatic ascites. Performing mycobacterial culture is appropriate only when there is a high degree of suspicion for tuberculosis. An elevated diaphragm may be observed on chest x-ray, while ultrasound is sensitive investigative utensil for detecting ascites. In addition to identify ascites, a CT scan can be helpful in identifying any masses. ^[9] Ascites indicates poor prognosis, with one and five-year survival rates of approximately 50% and 20% respectively. Mortality increases with kidney failure and other liver-related conditions ^[10] Treatment varies based on severity, ranging from dietary salt reduction and diuretics for mild ascites to paracentesis for severe cases. The primary objectives of therapy in individuals with ascites are to reduce the capacity of ascetic liquid and alleviate peripheral edema, while avoiding intravascular volume depletion. The mainstay of treatment involves implementing a low-sodium diet and prescribing diuretics. Diuretics (spironolactone to furosemide) and liquid drainage are mainstream approaches. To relieve the patient from ascites, fluid removal is done. In-order to avoid hypotension, albumin supplements is given. Instead of albumin, the practice of terlipressin is a recommended treatment option. For patients that don't answer to diuretics, viable treatment option is Transjugular intrahepatic portosystemic shunt (TIPS). If it is a symptom of a treatable liver condition such as autoimmune hepatitis, chronic hepatitis B, or hemochromatosis, specific therapies for these underlying diseases may be prescribed. For individuals with cirrhotic ascites, hepatic implantation is more effective treatment than medical therapy. Paracentesis, the oldest form of therapy for ascites, is a rapid and effective treatment of this complication. This procedure was abandoned after the introduction of the modern diuretics because it could induce serious complications, such as bacterial peritonitis, severe hypovolemia, renal failure, hyponatremia, protein depletion and hepatic encephalopathy.

Refractory ascites is defined by the presence of ascites that is unresponsive to a low-sodium diet and high-dose diuretics, or ascites that recurs rapidly after fluid removal. In cases of refractory ascities, Liver transplantation should be considered as a therapy for patients may be considered for refractory ascites ^[11, 12, 13] Diuretics like spironolactone (100mg/day) and loop diuretics (40mg/day)

are commonly used for cirrhotic ascites management. Careful management and monitoring are crucial to avoid complications ^[14, 15]

In our context, etiologies behind ascites and its correlation with symptoms and clinical findings are not yet studied and are still unknown, so the present study is initiated to describe ascites in terms of epidemiological, clinical and etiological aspect in a hospital setting.

Materials And Methods

This prospective observational study aimed to comprehensively assess the clinical profiles of ascites in a tertiary care hospital Conducted at Gandhi Hospital in Telangana State from September 2022 to March 2023. The objectives included in our study are evaluating ascites's clinical profile, identifying associated risk factors and past medical illness, assessing complications, and scrutinizing the management and treatment approaches employed within this hospital setting.

Study design and Sample

The study focused on ascetic patients admitted to the General Medicine and Gastroenterology in-patient departments. The criteria used to admit patients into the study includes patients with the age group >25years. The exclusion criteria included in the study are patients with age group less than 25years, Pregnant and lactating women, Geriatric patients (>80 years age group), Unconscious and critically ill patients. The study was approved by the Institutional Ethics Committee at CMR College of Pharmacy in Hyderabad, ensuring adherence to ethical guidelines throughout the study IEC number- CMRCP/IEC/2022-23/07. Data collection was meticulously carried out during the specified period from the admitted patient using data collection form. Statistical analysis involved the utilization of descriptive and inferential statistics, employing relevant significance tests to analyze the gathered data. This study aimed not only to deepen the understanding of ascites' clinical dynamics but also to contribute insights that could potentially enhance its management within this tertiary care hospital.

RESULTS

Around 113 cases were observed during a study period of 180 days, no patient has left or absconded the hospital. Finally, 113 cases were identified, included, investigated for clinical profile of ascites.

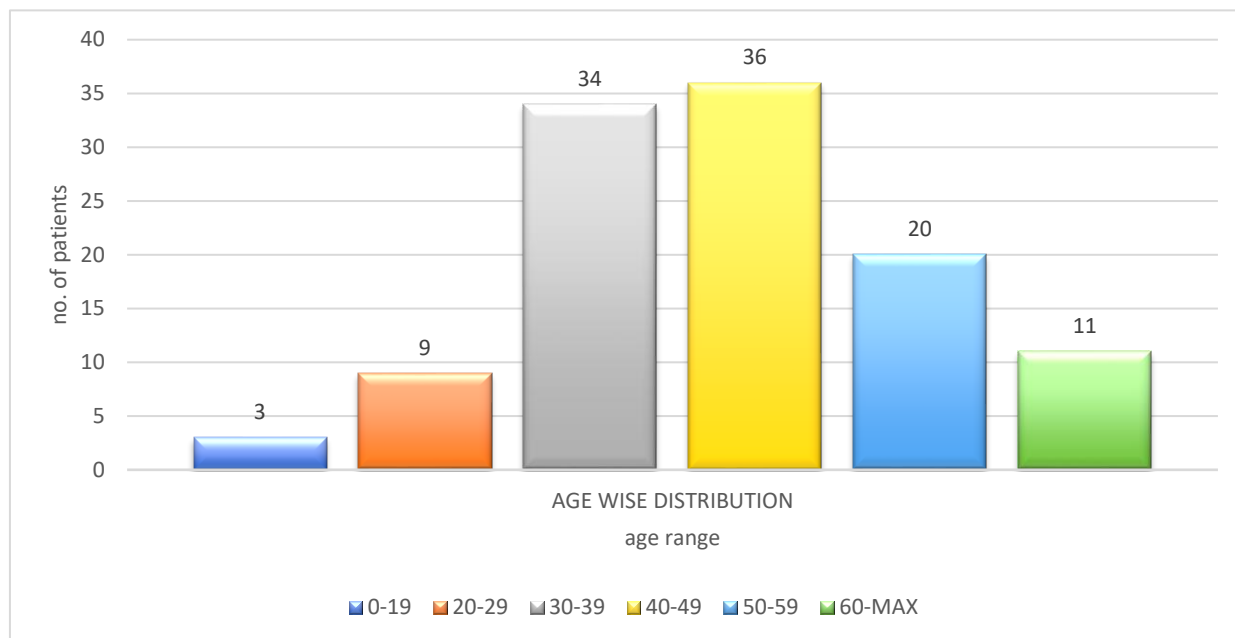
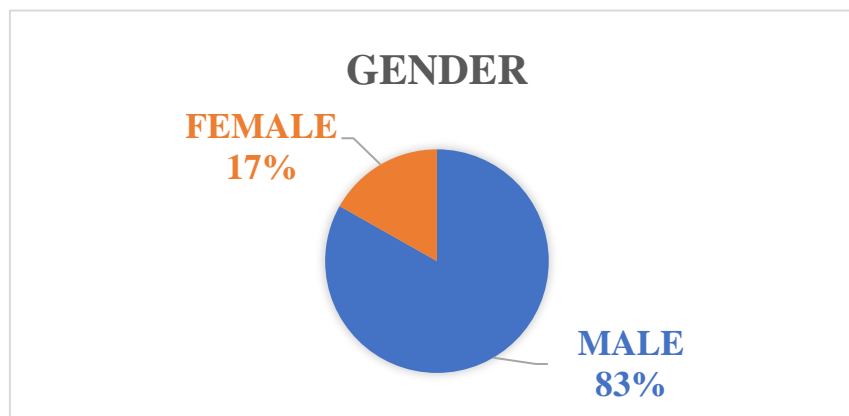
Figure 1. Age wise distribution of Ascites patients.

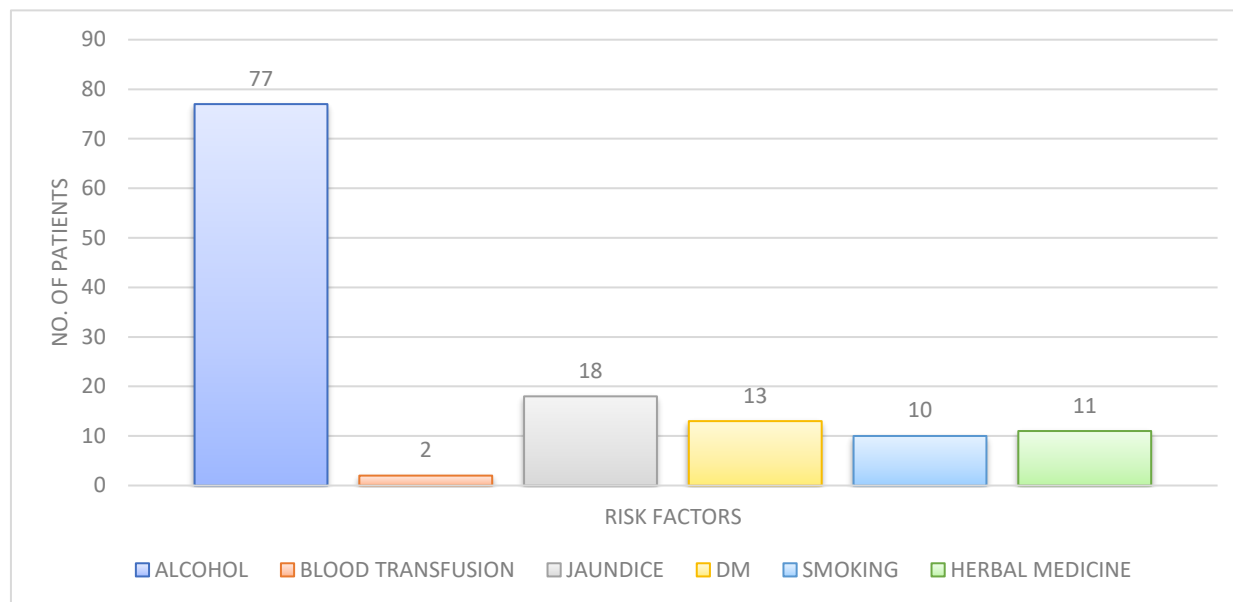
Figure 1. shows majority of age group was between 40-49 years (n=36), only 03 patients were admitted with Ascites with age group between 0-19 years. Figure 1 depicts that most of the ascites patients enrolled in the study were males (83%) and the rest were females (17%).

Figure 2. Gender Wise Distribution of Ascites Patients**Table 1. Etiology of ascites**

S. No	Etiology	Number Of Patients (N)	Frequency(%)

1	Cirrhotic Ascities (n=60)	Cirrhosis of liver	31	27.43
		Alcoholic liver disease	26	23
		Heptitis	3	2.65
2	Non-Cirrhotic Ascities (n=44)	Portal hypertension	20	17.69
		Jaundice	14	12.38
		Tuberculosis	3	2.66
		Pancreatitis	2	1.79
		Acute Kidney Injury	5	4.426
3	Refractory Ascities (n=9)	9	7.97	
	Total	113	100	

The Table 1 shows the most common clinical finding of Ascites as Cirrhosis of liver (n=31), followed Alcoholic Liver Disease (n=27) then Portal hypertension (n=21), then Jaundice (n=14) and Acute kidney injury (n=5). The least common etiology of Ascites as Pancreatitis (n=03). This represents cirrhotic ascites is more when compared to non- cirrhotic ascites. Thus table 1 suggests that CLD as the cluprit of ascites.

Figure 3. Risk Factors and Past Medical Illness for Ascites.

The above figure 3 indicates the most common risk factors and past medical illness of Ascites as alcohol (n=77) followed by jaundice (n=18) then Diabetes Mellitus (n=13) and Herbal medicines (n=11) then smoking (n=10). The least Hazardous factor for Ascites as history of blood transfusion (n=2).

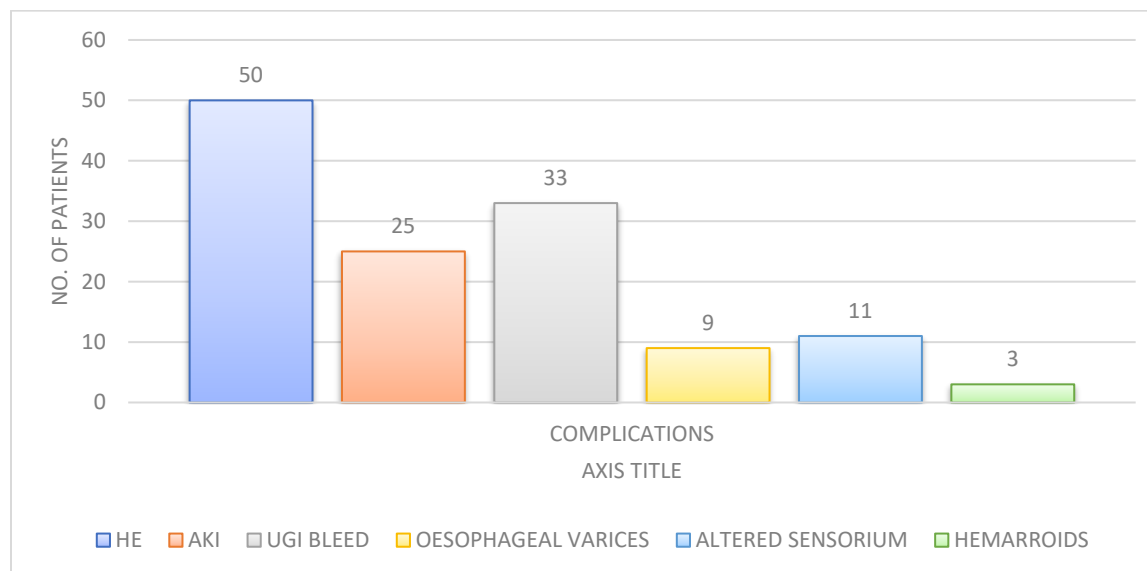
Table 2. Clinical Features of Ascites.

s.no	Clinical Findings		Number of patients (N)	Frequency (%)
1	Signs	Abdominal Distension	85	24
		Pedal Edema	49	14.2
		Icterus	45	13
		Weight Loss	4	1.15
2	Symptoms	Abdominal Pain	46	13.3
		Shortness of Breath	36	10.4
		Fever	30	8.0

		Decreased Urine Output	9	2.6
		Altered sleep pattern	13	3.7
		Nausea/Vomiting	8	2.5
		Cough	15	4.5
		Pleural Effusion	5	1.4
		TOTAL		100

The above Table 2 depicts the most common signs of ascites was Abdominal distension (n=85), icterus (n=45), pedal edema (n=49), weight loss (n=4). The most common Symptoms seen were Abdominal pain (n=46), Cough (n=15), fever (n=30), Decrease urine output (n=9), Nausea and vomiting (n=8), Shortness of breath (n=36), Altered sleep pattern (n=13).

Figure 4. Complications of ascites



Hepatic encephalopathy (50) followed by upper gastrointestinal bleed (33) then acute kidney injury (25), altered sensorium (11), oesophageal varices, hemarroids (3) were the complications observed in the study as shown in the figure 4

Table 3. Laboratory Findings of Ascites

S.no	Tests	Reference Value	Number of patients (N)	Frequency(%)
1	SAAG (n=106 Patients)	Exudative (<1.1mg/dl)	18	2.1
		Transudative (> 1.1 mg/dl)	88	10.4
2	INR Values (n=84 Patients)	<1.1 (Normal)	21	2.4
		> 1.1 (Effective Therapeutic Range)	63	7.4
3	Sodium	Normal (135 - 147 meq/l)	15	1.7
		Low (<135 meq/l)	52	6.1
4	Potassium	Normal (3.5 - 5.5 meq/l)	48	5.6
		Hypokalemia (< 3.5 meq/l)	14	1.6
		Hyperkalemia (> 5.5 meq/l)	7	0.8
5	Alanine Transaminase (SGPT)	Normal (0-30 u/l)	17	2
		High (> 30 u/l)	49	5.8
6	Aspartate Transaminase (SGOT)	Normal (0-40 u/l)	6	0.7
		High (> 40 u/l)	24	2.8
7	Alkaline Transaminase (ALP)	Normal (50 - 160 u/l)	16	1.8

		High (>160 u/l)	7	0.8	
8	Prothrombin	Normal (9.5 - 13.5 u/l)	15	1.7	
		High (Prolonged)	43	5	
9	Serum Protein	Normal (6.3-8u/l)	6	0.7	
		Low (< 6.3u/l)	4	0.47	
10	Serum Albumin	Normal (3.5-5.5u/l)	2	0.2	
		Low (< 3.5 u/l)	18	2.1	
11	Ascetic Protein	>2.5 u/l	54	6.3	
12	urea	Normal (20-0 u/l)	14	1.6	
		High (> 40)	64	7.5	
13	Creatinine	Normal (0.6-1.1 u/l)	34	4	
		High (> 1.1)	74	8.7	
14	Haemoglobin	Male	Normal	8	0.9
			Anemic	46	5.6
		Female	Normal	3	0.3
			Anaemic	14	2.8
		TOTAL		100	

The above Table depicts the laboratory findings of ascetic fluid. Among the 113 Patients SAAG (serum ascites albumin gradient) was tested for 106 patients out of which 18 had Exudative type of ascetic [$<1.1\text{mg/dl}$] and 88 had Transudative type of ascetic [$>1.1\text{mg/dl}$]. INR values were tested for 84 patients among which the values were found to be normal for 21 patients and the other 63

patients were falling under the Effective Therapeutic Range, hyponatremia were observed in 52 patients and 14 patients showed hypokalemia and 7 patients had hyperkalemia and normal potassium values were found in 48 patients. Increased levels of SGPT values were observed in 49 patients, increased levels of SGOT values were observed in 24 patients suggesting deranged liver function. Increased levels of Prothrombin originated in 43 patients, low serum protein was seen in 4 patients, serum albumin remained less in 18 patients, 54 patients has abnormal ascetic protein values and 64 patients had high blood urea, high creatinine was observed in 74 patients, suggesting deranged renal function. In case of haemoglobin values 46 males were anaemic and 14 females were anaemic.

Table 4. Clinical Management of Ascites

S.NO	Drug Category	Drug	Number of patients (N)	Frequency(%)
1	Diuretics (n=103)	Lasilactone	19	4.6
		Furosemide	44	10.8
		Spiranolactone	40	9.8
2	Blood Transfusion	Human Albumin	77	19
3	Vitamins	Vitamin K	18	4.4
		Thiamine	8	1.9
		Vitamin B Complex	9	2.2
4	Antibiotics	Rifaximine	43	10.6
		Cefpodoxime Proxetil	12	2.9
		Cefixime	16	3.9
		Ceftriaxone	3	0.7

		Augmentin	4	0.9
		Metronidazole	1	0.2
		Piperacillin Tazobactam	1	0.2
5	Antifungal	Fluconazole	1	0.2
6	Osmotic Laxatives	Lactulose	51	1.4
7	Anti Hypertensive	Terlipressin	6	2
		Carvedilol	12	2.9
8	Opioid Analgesic	Tramadol	8	1.9
9	Hepato- Protectants	Ursodeoxycholicacid	31	9
10	Antiepileptics	Levitriacetam	1	0.2
		TOTAL	405	100

The above table 4 describes about the management of ascities, where diuretics were majorly prescribed for 103 patients and human albumin therapy was given for 77 patients and other treatments such as antibiotic therapy for 80 patients, osmotic laxative for 51 patients, vitamins were given to 35 patients, hepato- protectants in 31 patients, 18 patients were prescribed with anti-hypertensive to treat portal hypertension, opioid analgesic were given for 8 patients. Only 1 patient was prescribed with anti-epileptics and anti-fungal.

DISCUSSION

Ascites is a fatal presentation, with many causes behind and can occur at any age but specific etiology may differ. This presentation is common all over the world in medical practice. Its Etiology can be suspected from history and examination, but ascitic fluid analysis is an important investigation to diagnose the cause. Its early detection is required to ensure effective management without complications.

In this prospective observational study, we aimed to comprehensively evaluate the clinical profiles of ascites in a tertiary care hospital. Our findings align with existing research on several aspects of ascites, providing insights into the causes, risk factors, and management of this condition. Our study observed a higher prevalence of male patients (83.18%) compared to females, consistent with previous research (**Dovonou, 2017**)^[18]. This gender distribution suggests potential differences in susceptibility or health-seeking behavior among genders. The age distribution in our study revealed that patients between 40-49 years were the most affected (31.8%), followed by those with the 30-39 years age group (30%), which is in line with research by **Mehre Darakhshan (2020)**^[17]. These findings echo trends observed in other studies and emphasize the impact of age on ascites prevalence. Cirrhotic ascites was the leading cause (27.4%) in our study, followed by alcoholic liver disease (23%) and hepatitis (2.65%), consistent with a study by **Bhupinder Kumar (2016)**^[19]. These results correlate with previous studies, underscoring the significant role of liver-related conditions in ascites etiology. Risk factors and past medical history revealed a strong association with alcohol consumption (58.7%), followed by jaundice, diabetes mellitus, and herbal medicine use, similar to the findings of **Omar Abdu Muhie (2019)**^[6]. The clinical characteristics of ascites patients were consistent with prior studies. Abdominal distension (46.44%) was the most common sign, followed by pedal edema and icterus. Abdominal pain (28.39%) was the most frequent symptom, followed by shortness of breath and fever, in agreement with **Uddin J (2020)**^[17]. Hepatic encephalopathy (35.71%) emerged as the primary complication in our study, aligning with earlier findings (**Srinivasan Rao Sudulagunta, 2015**)^[20]. This highlights the significant burden of hepatic encephalopathy in ascites patients. Regarding ascitic fluid analysis, our findings showed that transudative ascites (SAAG >1.1g/dL) was more prevalent, suggesting a predominant etiology of cirrhotic ascites, similar to the study by **Shrestha D (2018)**^[22]. This is a valuable diagnostic marker for differentiating between liver-related and non-liver-related ascites. In terms of management, diuretics (25.5%) and human albumin therapy (19%) were the most commonly prescribed treatments, consistent with the study by **Huang HC (2013)**^[21] and in line with current guidelines for managing ascites.

CONCLUSION

In conclusion, our study provides a comprehensive overview of the clinical profiles of ascites in a tertiary care hospital. It reaffirms cirrhotic ascites as the leading cause and highlights the significant role of alcohol consumption and jaundice as risk factors. Abdominal distension and

hepatic encephalopathy were predominant clinical characteristics and complications, respectively. The study underscores the effectiveness of diuretics and human albumin therapy in managing ascites. Clinicians should consider the wide range of etiologies when evaluating ascites patients and give due attention to these factors to ensure appropriate and effective management. Further, it is necessary for a clinician to consider and give priority to these diseases, for effective management and to decrease the complication. Thus, research can delve into the impact of gender and age on ascites prevalence and explore new approaches to ascites treatment and prevention.

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Conflict of Interest: The authors declare no conflict of interest.

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