

Original Research Article

Study of epidemiology and management of liver abscess in Jammu region

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ABSTRACT

Background: Liver abscess is a common medical condition with different causes and variable morbidity and mortality in different parts of the world, this study has looked into epidemiology, pattern of disease gender and age of affected patients and associated factors.

Methods: This prospective study was conducted at a government medical college over a period of one year from August 2022 up to July 2023. Data of patients managed at our centre was collected, analysed and interpreted on MS Excel.

Results: The majority of affected patients were male (77.5%). 30 to 40 years age group was the most commonly affected, most of the patients presented with complaints of pain abdomen (85%). Amoebic abscess was present in 71.25% of patients. The right lobe of the liver was involved most commonly (67.5%). Conservative management was successful in 56.25% of patients. Alcohol intake was present in 43.75% of patients, complications were pleural effusion, portal vein thrombosis, necrotizing colitis and gastrointestinal bleeding.

Conclusions: In the present era of modern medical science, diagnosis of liver abscesses has become easy through radiological and serological tests, and treatment modalities from minimally invasive to conservative have proved successful in the treatment of liver abscesses. Antibiotics remain the primary course of treatment for both amoebic liver abscess (ALA) and pyogenic liver abscess (PLA), unless there is persistent fever, a substantial abscess cavity, or complications that require surgical intervention. However, challenges persist in combating antibiotic resistance, stemming from incomplete and over-the-counter misuse of available medications. Special concerns include associated comorbidities, delayed medical consultation, and treatment-seeking behavior, as well as the misuse of unhealthy substances or alcohol.

Keywords: Amoebic, Liver abscess, Pyogenic

INTRODUCTION

A liver abscess is a collection of necrotic material composed of the dead pathogen, lysed white blood cells, fibrin, and surrounding inflammatory cells or necrotic liver cells depending upon the causative organism and mechanism of abscess formation.¹ Amoebic liver abscess (ALA) and pyogenic liver abscess (PLA) are the two most common types of liver abscesses, ALA is the most common in developing countries, PLA is most common in developed countries, infective organisms invade the

liver from other abdominal areas like the appendix, colon, etc through portal vein, ascending infection from the biliary tree, through blood from distant focus, direct extension from contiguous organs and penetrating trauma.^{2,3} ALA caused by *Entamoeba histolytica* is the most common extraintestinal manifestation of amebiasis and it accounts for two-thirds of cases of liver abscesses in developing countries.⁴ The management of liver abscess has evolved over time, in the pre-antibiotic era open surgical drainage was the only option available with high morbidity and mortality rates, now with the

invention of modern diagnostic radiological methods, diagnostic serological tests, laparoscopy, radiological guided percutaneous drainage and aspiration, mortality rate has decreased significantly, although not the incidence.^{4,5}

Objectives

The primary objectives of this study were to investigate the epidemiology of liver abscesses, examine the disease pattern, identify the age and gender groups most affected, and explore any associated causative factors.

METHODS

This prospective observational study was carried out from August 2022 to July 2023 at Government Medical College and Hospital Jammu following ethical clearance from the institutional ethics committee. The study included a total of 80 patients aged 18 years and above, admitted from the emergency department, outpatient department (OPD), or referred from peripheral hospitals, exhibiting clinical, radiological, and laboratory findings suggestive of liver abscess (pyogenic liver abscess and amoebic liver abscess). All interventions and data collection were performed after obtaining proper consent from both patients and their attendants.

Patients excluded were those, who presented with ruptured liver abscess, severe sepsis and in MODS on admission, immunosuppression, tubercular abscess, fungal abscess, concurrent malignancy, and recent or past hepatobiliary surgical intervention.

Upon admission, comprehensive baseline investigations were conducted, including a thorough history and clinical examination, which were meticulously documented. The investigative panel comprised complete blood count (CBC), renal function tests (RFTs), liver function tests (LFTs), coagulation profile, viral serology, and blood cultures for febrile patients. Aspiration of abscess for cultures was performed when feasible. Ultrasonography findings of the abdomen were noted and documented, along with chest x-ray. Contrast-enhanced computed tomography (CECT) of the abdomen was conducted when necessary, and amoebic serology was carried out when required.

Patients were initiated on injectable ceftriaxone, amikacin, and metronidazole, along with antipyretic, analgesic, and PPIs after cultures were sent when feasible. Monitoring of vitals was done; charting of temperature was done. Blood sugar monitoring and insulin was used for diabetic patients when required. Hydration of patients was done by i.v. dextrose solution, patients with dehydration due to vomiting and anorexia, usually had deranged RFTs. Injection vitamin K was given for 5 days to patients with deranged coagulation profiles. Patients with peritonitis and TLC > 18000/dl were

started on injection piperacillin-tazobactam and metronidazole.

Patients with ultrasound evidence of a large abscess (>5 cm) showing liquefaction and persistent fever were subjected to percutaneous drainage. Conversely, those with small multiple abscesses without signs of liquefaction were managed conservatively. Injectable antibiotics were administered for up to 48 hours after the patients achieved clinical stability and were able to tolerate oral intake or became afebrile. Discharge involved a prescription for oral antibiotics for 10 days in the case of pyogenic liver abscess (PLA), and oral metronidazole at a dose of 800 mg three times daily for 2 weeks, with further decisions on continuation based on clinical and abdominal ultrasonography findings during follow-up.

RESULTS

In this study, the majority of patients were male. Out of the 80 patients included, 62 (77.7%) were male, while 18 (22.5%) were female (Table 1).

Table 1: Gender distribution of patients.

Gender	Males	Females	Total
Number	62	18	80
Percentage	77.5	22.5	100

The mean age of the patients was 45.02 years, ranging from 22 to 81 years. The highest proportion of patients, comprising 35%, fell within the 30 to 40 years age group (Table 2).

Table 2: Age distribution of patients.

Age in years	Number of patients	Percentage
21-30	12	15
31-40	28	35
41-50	10	12.5
51-60	20	25
61-70	2	2.5
71-80	5	6.25
81-90	1	1.25
Range	22-81	
Mean	45.02	
Median	40	
Mode	38	

The primary complaint reported by patients in this study was pain in the right upper abdomen, noted in 85% of participants. The second most common concern was a decreased appetite or anorexia. Fever was prevalent in 76.25% of patients, while 35% experienced vomiting. Additionally, a history of dyspepsia or indigestion was reported by 37.5% of patients, and 27.5% had a history of dysentery or episodes of loose stools in the past (ranging from weeks to months). Other complaints, such as cough,

were noted in 26.25% of patients, and yellowish discoloration or jaundice was present in 15% of patients (Table 3).

Table 3: Chief complaints of patients.

Complaints	Frequency	Percentage
Pain	68	85
Fever	61	76.25
Anorexia	64	80
Vomiting	28	35
Cough	21	26.25
Dysentery	22	27.5
Dyspepsia	30	37.5
Jaundice	12	15

Table 4: Significant personal history and associated comorbidities.

	Frequency	Percentage
Alcoholism	35	43.75
I.v. drugs abuse	8	10
Diabetes	25	31.25
HTN	16	23.7
CVA	6	7.5
Coronary stenting	4	5
History of ATT intake	4	5
Psychosis	2	2.5
Neurosis	6	7.5

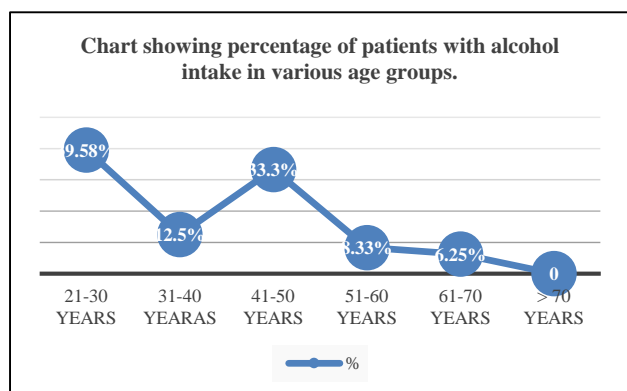


Figure 1: Chart showing percentage of patients with alcohol intake in various age groups.

In our study, a history of alcohol intake was present in 43.75% of patients. Additionally, 10% of patients reported a history of intravenous drug abuse, indicating a concerning upward trend in our population. Other prevalent comorbidities included diabetes in 31.25% of patients, hypertension (HTN) in 23.7%, a history of cardiovascular accident (CVA) in 7.5%, coronary stenting in 5%, a history of anti-tubercular treatment (ATT) intake in 5%, neurosis in 7.5%, and psychosis in 2.5% of patients (Table 4). Two distinct peaks in alcohol consumption were observed within our study groups (Figure 1).

Table 5: Laboratory parameters on admission.

Parameters	Frequency	Percentage
Hb<12 gm/dl	38	47.5
TLC>12000/dl	66	82.5
>20000/dl	17	21.25
Bilirubin >2 mg/dl	27	33.75
Raised levels of ALP	52	65
Albumin <3.4 gm/dl	37	46.25
PTI<75%	30	37.5
Blood urea >40 mg/dl	16	20
Creatinine >1.4 mg/dl	11	13.75
Raised levels of SGOT	28	35
Raised levels of SGPT	30	37.5

In the laboratory parameters of patients in our study, anemia, defined by hemoglobin levels less than 12 grams/dl, was observed in 47.5% of patients. Among this group, 22.5% (18 patients) received blood transfusions due to hemoglobin levels falling below 8 grams/dl (Table 5).

In our study, the total leukocyte count (TLC) was elevated above 12,000/dl in 82.5% of patients, and 21.25% of patients had TLC exceeding 20,000/dl. Elevated TLC below 20,000/dl was not consistently associated with abdominal findings but showed a correlation with fever. However, patients with TLC exceeding 20,000/dl exhibited positive abdominal findings such as peritonism and localized guarding. Additionally, bilirubin levels exceeding 2 mg/dl were present in 33.75% of patients. (Table 5), and clinically visible jaundice was present in 15% of patients (Table 3).

In the liver function tests, elevated alkaline phosphatase (ALP) levels were more prevalent in patients compared to the levels of serum glutamic oxaloacetic transaminase (SGOT) and serum glutamic pyruvic transaminase (SGPT) (Table 5).

In our study, the renal function tests of 11 patients (13.75%) revealed creatinine levels exceeding 1.4 mg/dl. Notably, none of these patients had a history of chronic kidney disease. The elevated creatinine levels were attributed to dehydration, a consequence of decreased oral intake and vomiting. Importantly, these cases were successfully addressed through patient rehydration, underscoring the reversible nature of the renal function abnormalities in the context of fluid imbalance (Table 5).

Albumin levels below 3.4 grams/dl were observed in 33.75% of the patients in our study. Notably, the majority of these patients were identified as alcoholics, and this subgroup also exhibited a more frequently deranged coagulation profile. In contrast, among the patients on anticoagulants for a history of cerebrovascular accident (CVA) and coronary stenting, comprising 10% of the total, none displayed a deranged coagulation profile (Tables 4 and 5).

Table 6: Prevalence of amoebic and pyogenic abscess.

Abscess type	Frequency	Percentage
Amoebic	57	71.25
Pyogenic	23	28.75
Total	80	100

In this study, the majority of patients, accounting for 71.25%, were diagnosed with amoebic liver abscess. The diagnosis was established based on characteristic radiological findings and confirmed by ELISA serology. In contrast, 28.75% of patients were identified with pyogenic liver abscesses. These results emphasize the importance of combining radiological evidence with serological confirmation for accurate diagnosis and appropriate management of different types of liver abscesses (Table 6).

Table 7: Methods of management of patients with liver abscess.

Method	Frequency	Percentage
Conservative	45	56.25
PCA*	10	12.5
PCD**	16	20
Laparoscopic drainage	3	3.75
Open laparotomy	6	7.5

*Percutaneous aspiration. **Percutaneous drainage.

The primary approach to management in our study involved conservative measures, constituting 56.25% of patients. Percutaneous drainage under ultrasonography was performed in 20%, aspiration in 12.5%, laparoscopic drainage in 3.75%, and laparotomy in 7.5% of patients. Among the six patients undergoing laparotomy, three were operated on for amoebic colitis. In one case, a right extended colectomy was performed, while two patients underwent total colectomy (Table 7).

Table 8: Radiological characteristics on CXR, USG and CECT abdomen.

Characteristics	Frequency	Percentage
Right lobe liver	54	67.5
Left lobe of liver	16	20
Bilateral lobes	10	12.5
Single abscess cavity	25	31.25
Multiple abscesses cavities	55	68.75
Subcapsular abscess	11	13.75
Abscess	<5 cm	30
	>5 cm	34
	>10 cm	16
Pleural effusion	28	35
Hepatomegaly	25	31.25

In this study, the predominant location of liver abscesses was in the right lobe, affecting 67.5% of patients.

Bilateral lobe involvement was observed in 12.5%, while a solitary abscess was present in 31.25% of patients. Notably, in cases where the abscess size exceeded 10 cm, occurring in 30% of patients, all of them underwent drainage procedures (Table 8).

In our study, pleural effusion was evident in 35% of patients, with the majority experiencing varying levels of respiratory symptoms. Among the 28 patients with pleural effusion, 8 required intercostal chest tube (ICCT) drainage, while the remaining patients with mild respiratory signs showed improvement through a single ultrasound-guided pleural tap, coupled with incentive spirometry (Table 8).

In patients with pyogenic abscesses, blood cultures yielded positive results in 55% of cases, while pus cultures showed positivity in 33.3% of patients. The lower positive culture rate for pus samples may be attributed to the use of over-the-counter antibiotics without medical consultation and incomplete treatment. Conversely, the slightly higher positive culture rate for blood cultures could be due to the fact that blood samples were collected during fever spikes, a timing not feasible for pus samples.

Table 9: Results of pus and blood samples for cultures in cases of pyogenic liver abscess.

Specimen (N)*	Positive		Negative	
	N	%	N	%
Blood (20)	11	55	9	45
Pus (12)	4	33.3	8	66.7

*Number of samples of blood and pus sent for cultures out of 23 patients with pyogenic abscess.

The predominant organisms identified in culture reports were *Klebsiella* and *E. coli*, highlighting their significant role in the etiology of pyogenic liver abscesses in our study (Table 9).

Table 10: Complications.

Complications	Number	Percentage
Pleural effusion	28	35
Portal vein thrombosis	5	6.25
Fulminant necrotizing colitis	3	3.75
Malena/UGI bleed	4	5

The primary complication observed in our study was pleural effusion, affecting 35% of patients and leading to respiratory symptoms in this subgroup. Furthermore, 10% of patients required the placement of an intercostal drainage tube to address the effusion. Portal vein thrombosis was documented in 6.25% of patients, all of whom successfully recovered with conservative treatment involving low molecular weight heparin. Three patients developed fulminant necrotizing amoebic colitis, and

unfortunately, one patient succumbed to severe sepsis. Gastrointestinal bleeding emerged as another complication attributed to a deranged coagulation profile, particularly notable in patients with a history of chronic alcoholism. Tragically, one patient, known for cerebrovascular accident (CVA) with coronary stenting, succumbed to acute myocardial infarction. These findings underscore the diverse and serious nature of complications associated with liver abscesses in our study (Table 10).

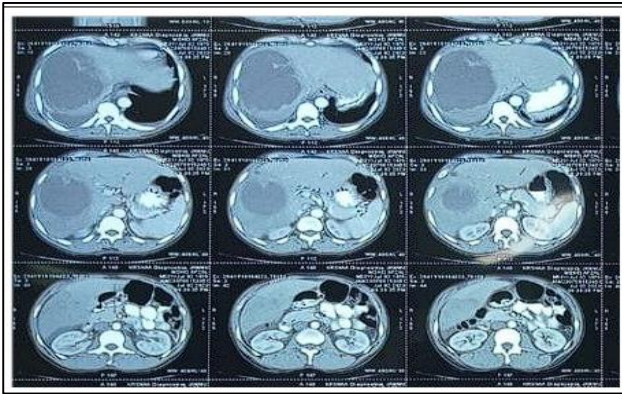


Figure 2: CECT abdomen showing large liver abscess in the right lobe of the liver.

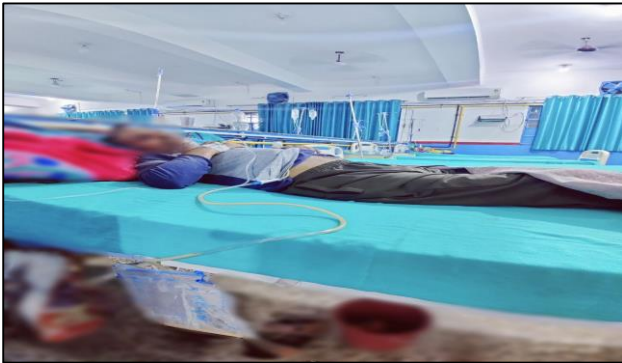


Figure 3: Patient with percutaneous drainage of liver abscess.

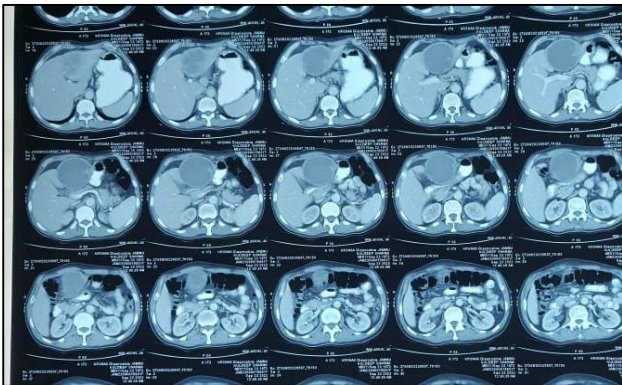


Figure 3: CECT showing abscess in left lobe of liver.

DISCUSSION

Advancements in modern medical science have transformed the diagnosis and treatment of liver abscesses. The traditional approach involving open surgical drainage, associated with high procedural morbidities, has given way to less invasive methods such as percutaneous and endoscopic drainage procedures. Additionally, conservative management with antibiotics has become a viable alternative, reflecting the evolution towards more patient-friendly and minimally invasive interventions.^{4,5,7}

In our study, male patients constituted the majority, accounting for 77.5% of the total. This finding is consistent with the study by Pradhan et al, which reported 85.7% of male patients in their research.⁸

The predominant age group in our study was 40-60 years, aligning with similar data reported by Pradhan et al.⁹

In our study, abdominal pain emerged as the most prevalent symptom, affecting 85% of patients. A study by Pradhan et al reported a slightly higher incidence, with abdominal pain present in 98% of their patients.⁹ In contrast, Das et al found fever to be the most common complaint among patients in their study.¹⁰

In our study, a history of chronic alcohol intake was identified in 60% of patients. In contrast, Chen et al reported a lower incidence of alcoholism, with only 12.5% of patients having a history of chronic alcohol intake in their study.¹¹

In our study, a total leukocyte count (TLC) exceeding 12000/mm³ was observed in 82.75% of patients. Findings from McDonald et al reported TLC exceeding 12000/mm³ noted in 73% of their study participants.¹²

In our study, incidence of anemia, with hemoglobin levels below 12 grams/dl, was identified in 47.5% of patients. Findings from a study by Adams et al, reported a slightly higher incidence of anemia with hemoglobin levels less than 12 in 63% of their study participants.¹³

In the liver function tests, the most consistent abnormality observed was elevated alkaline phosphatase (ALP), which was present in 65% of patients in our study. This finding is in line with results from Shrestha et al, who reported raised ALP in 56% of patients. On the other hand, Choudhary et al reported a higher incidence, with raised ALP noted in 83% of patients in their study.¹⁴

Elevated alkaline phosphatase (ALP) did not demonstrate significance in differentiating amoebic liver abscess (ALA) from pyogenic liver abscess (PLA) in our study, aligning with similar observations found in the existing literature.¹

In our study, hypoalbuminemia was identified in 46.25% of patients. Comparable findings were reported in a study by Perez et al, where hypoalbuminemia was observed in 50% of the patient population.⁶

We observed a higher incidence of hypoalbuminemia in the amoebic liver abscess (ALA) group, consistent with findings reported in the existing literature.²

In our study, the majority of patients presented with amoebic liver abscesses, constituting 71.25% of the cases. Correspondingly, Ghosh et al reported amoebic liver abscesses in 69% of patients in their study.⁴

Radiological findings in our study revealed a predominant occurrence of right lobe liver abscess in the majority of patients, accounting for 67.5%, with lesions exceeding 10 cm in size in 20% of cases. In a study by Jindal et al, in their observations, right lobe involvement was reported in 77.7% of patients and abscess cavities larger than 10 cm in size were observed in 11.9% of cases.¹⁵

In our study, 56.25% of patients underwent conservative management, while the remaining patients required interventions such as aspiration, percutaneous drainage, laparoscopic drainage, and open drainage. Notably, a study by Lo et al reported a conservative management rate of 51% in their research.¹⁶

In our research, within the percutaneous drainage cohort, of the 16 patients (20%) 6 patients experienced bile drainage through a catheter due to biliary communications, in five instances, the catheter was retained for six weeks along with oral hyoscine bromide administered thrice daily. In one patient, biliary stenting was performed as there was no evidence of a decrease in bile output after two weeks.

Limitation

The limitation of this study was its small cohort size.

CONCLUSION

In the present era of modern medical science, diagnosis of liver abscesses has become easy through radiological and serological tests, and treatment modalities from minimally invasive to conservative have proved successful in the treatment of liver abscesses. Antibiotics remain the primary course of treatment for both amoebic liver abscess (ALA) and pyogenic liver abscess (PLA), unless there is persistent fever, a substantial abscess cavity, or complications that require surgical intervention. However, challenges persist in combating antibiotic resistance, stemming from incomplete and over-the-counter misuse of available medications. Special concerns include associated comorbidities, delayed medical consultation, and treatment-seeking behavior, as well as the misuse of unhealthy substances or alcohol.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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