



Original Article

## SOCIO-DEMOGRAPHIC, CLINICAL CHARACTERISTICS, MANAGEMENT AND OUTCOME OF LIVER ABSCESS: A TERTIARY CARE CENTER BASED OBSERVATIONAL STUDY

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### ABSTRACT

**Background:** Liver abscess is a localized collection of pus in the liver, often caused by bacterial or parasitic infections, and represents a significant health burden in developing countries.

**Objective:** To study the socio-demographic, clinical characteristics, and outcomes associated with various management approaches for liver abscesses.

**Methods:** This prospective observational study was carried out at Dr. S.N. Medical College, Jodhpur, from March to September 2024. One hundred adult patients diagnosed with liver abscess based on clinical and radiological findings were included. Patients were managed conservatively, through needle aspiration, or by pigtail catheterization depending on abscess size and volume. Outcomes such as hospital stay, symptom resolution, and radiological improvement were recorded and analyzed.

**Results:** Males (88%) and patients above 50 years (34%) were predominantly affected. Most patients belonged to lower socioeconomic classes. Common symptoms included abdominal pain (96%) and fever (92%). Pyogenic liver abscesses (56%) were more frequent than amoebic ones (44%). Needle aspiration (46%) was the most common intervention, followed by catheter drainage (34%) and conservative therapy (20%). Needle aspiration resulted in the shortest hospital stay (mean 7.8 days) and fastest clinical improvement.

**Conclusion:** Liver abscesses mainly affect older males from lower socioeconomic strata. Accurate radiological assessment helps guide effective treatment, with needle aspiration showing superior outcomes in appropriately selected patients.

**Keywords:** Liver abscess, Pyogenic liver abscess, Amoebic liver abscess, Image-guided drainage, Needle aspiration.

### INTRODUCTION

Liver abscess is a serious and potentially life-threatening condition characterized by a localized collection of pus within the liver parenchyma, resulting from bacterial, parasitic, or fungal infections.<sup>1</sup> The liver's vital role in metabolism, detoxification, and immune defense makes it particularly vulnerable to significant morbidity and mortality when affected by abscess formation.<sup>2</sup>

Liver abscess remains a major health concern worldwide, with incidence varying according to geographic location, socioeconomic status, and underlying health conditions. In developed countries, the reported incidence ranges from 2.3 to 3.6 per 100,000 population, whereas higher rates are observed in developing countries due to poor sanitation, parasitic



infections, and limited healthcare infrastructure.<sup>3, 4</sup> The disease affects individuals across all age groups; however, adults are more commonly affected than children, with the highest incidence reported between 40 and 60 years of age.<sup>5</sup> Studies consistently demonstrate a male predominance, with a male-to-female ratio ranging from 2:1 to 4:1. This gender disparity is attributed to differences in occupational exposure, higher alcohol consumption, and increased prevalence of underlying liver disease among men.<sup>6</sup>

Socioeconomic status plays a crucial role in the epidemiology of liver abscess. Individuals from lower socioeconomic backgrounds are at increased risk due to poor nutrition, inadequate access to healthcare, and unhygienic living conditions that facilitate the transmission of infectious agents.<sup>7</sup> Geographic location significantly influences the etiology of liver abscesses. In developed countries, pyogenic liver abscesses—commonly caused by *Escherichia coli* and *Klebsiella pneumoniae*—are more prevalent, whereas in tropical and subtropical regions, amoebic liver abscesses caused by *Entamoeba histolytica* are more common.<sup>8, 9</sup>

Several risk factors predispose individuals to the development of liver abscess. These include underlying liver diseases such as cirrhosis, hepatitis, and hepatocellular carcinoma; diabetes mellitus; biliary tract diseases; immunosuppression; travel to endemic areas; and chronic alcohol consumption.<sup>5</sup> Diabetes mellitus is a particularly important risk factor due to impaired immune function and poor glycemic control.

Pyogenic liver abscesses represent the most common type, accounting for approximately 80–90% of all cases.<sup>10</sup> They are typically polymicrobial in nature. Frequently isolated organisms include gram-negative bacteria such as *Escherichia coli*, *Klebsiella pneumoniae*, and *Proteus* species; gram-positive organisms such as *Staphylococcus aureus* and *Streptococcus* species; and anaerobic organisms including *Bacteroides* and *Clostridium* species.<sup>11</sup> Amoebic liver abscesses are caused by *Entamoeba histolytica*, transmitted through contaminated food and water, and are more common in areas with poor sanitation and hygiene practices.<sup>12</sup> Fungal liver abscesses are rare and usually occur in immunocompromised individuals, with *Candida* species being the most common pathogens.<sup>13</sup>

The clinical presentation of liver abscess is variable, ranging from asymptomatic cases detected incidentally to severe life-threatening illness. Symptoms depend on abscess size, number, and location, as well as the patient's underlying health status. Fever is the most consistent symptom, present in over 90% of cases, while right upper quadrant abdominal pain occurs in 50–75% of patients.<sup>14</sup> Other symptoms include nausea, vomiting, anorexia, and jaundice, particularly in cases involving the biliary tree. On examination, hepatomegaly and localized tenderness are common findings.<sup>14</sup>

The pathogenesis of liver abscess involves entry of infectious agents through multiple routes, including the portal vein, biliary tract, hematogenous spread, direct extension from adjacent structures, and trauma or surgical interventions. Diagnosis relies on laboratory investigations showing leukocytosis and elevated inflammatory markers, along with imaging modalities such as ultrasonography and computed tomography.

Management includes antimicrobial therapy, image-guided drainage, and surgical intervention in selected cases. Advances in diagnostic imaging, antimicrobial therapy, and minimally invasive drainage techniques have significantly improved outcomes, reducing overall mortality to less than 10%.<sup>15</sup> However, mortality remains higher in elderly patients, those with multiple comorbidities, and cases with delayed diagnosis or treatment.<sup>15</sup>

## MATERIALS AND METHODS

This was a prospective observational study conducted from March to September 2024 at the Department of General Surgery, Dr. S.N. Medical College, Jodhpur. Total 100 patients were included in this study. This study was designed to assess the socio-demographic, clinical characteristics, management and outcome of liver abscess. The study included all patients aged over 18 years of either gender presenting with suspected liver abscess confirmed by ultrasonography (USG) or computed tomography (CT). Exclusion criteria were included Traumatic liver abscess, Past history of liver abscess, Patients with bleeding disorders, Patients with skin infections, Ruptured liver abscess with peritonitis, Patients with severe comorbid conditions like HIV or miliary tuberculosis.

Patients were admitted from emergency and outpatient departments with a diagnosis of liver abscess. The diagnosis was based on a history of anorexia, fever, and abdominal pain, with or without preceding diarrhea, and findings of tender hepatomegaly, leukocytosis, and radiological evidence of liver abscess. After detailed history taking and clinical examination, radiological investigations were performed. Patients diagnosed with liver abscess were categorized into three groups based on the size and volume of the abscess observed in radiological investigations. Group 1 include abscesses <5 cm in diameter and <100 ml in volume. Group 2 include abscesses <5 cm in diameter and 100-200 ml in volume. Group 3 include abscesses >5 cm in diameter and >200 ml in volume.



Group first was managed with medical management included administering second-generation cephalosporins, aminoglycosides, and Inj. Metronidazole. Group second managed with needle aspiration using an 18G needle. Group third managed with catheter drainage. The effectiveness of treatment was measured by hospital stay duration, days to clinical improvement, days to achieve a 50% reduction in abscess cavity size, and days to total/near-total resolution of the abscess cavity. Data were analyzed using SPSS v22. Continuous variables were presented as mean  $\pm$  SD and compared using Student's t-test. Categorical variables were analyzed with the Chi-square test. A p-value <0.05 was considered statistically significant

## RESULTS

The age distribution of patients revealed that the majority of cases are over 50 years old (34%) followed by those aged 31-40 years (26%). A smaller proportion of patients fell into the younger age groups with 20% each in the <30 years and 41-50 years categories. In present study the sex distribution shows male predominance (88%) than females (12%).

**Table 1. Distribution of patients according to age and sex**

Age groups (years) & sex	No of Cases(100)	Percentage
<30 years	20	20
31-40	26	26
41-50	20	20
>50	34	34
Male	88	88
Female	12	12

**Table 2. Distribution of patients according to socioeconomic status as per Kuppuswamy scale**

SES	No. of cases	Percentage
Upper	4	4
Upper middle	16	16
Lower middle	24	24
Upper lower	26	26
Lower	30	30
Total	100	100

In present study we observed most patients were from the lower socioeconomic strata, with 30% in the lower class and 26% in the upper lower class. Only a small percentage belonged to the upper-middle (6%) and upper classes (4%).

**Table 3. Distribution of patients according to symptoms and signs**

Symptoms and Signs	No of cases	Percentage (%)
Abdominal pain	96	96
Fever	92	92
Cough	30	30
Jaundice	28	28
Diarrhea	18	18
Weight loss	32	32
Abdominal distention	56	56
Tenderness	100	100
Temperature >38.5°F	94	94
Tachypnea	46	46
Pallor	24	24
Icterus	28	28

Most common presenting complaints among patients were abdominal pain (96%) and fever (92%), followed by abdominal distention (56%) and weight loss (32%). Symptoms such as cough (30%), jaundice (28%), and diarrhea (18%) were less frequently observed. Tenderness was universally present in all patients (100%), with the majority also exhibiting elevated body temperature (>38.5°F) (94%). Tachypnea was observed in 46% of cases, while pallor (24%) and icterus (28%) were less common.



Systemic complications are less frequent but still notable, with subphrenic abscess being found in 6% and pleural effusion in (4%). Pyogenic liver abscesses are present in 56% and amoebic abscess present in 44% of cases. The laboratory findings indicated a mean hemoglobin level of  $9.2 \pm 2.3$  g/dl and a total leukocyte count of  $14,500/\text{cc} \pm 3200/\text{cc}$  with max count  $\sim 26000/\text{cc}$  in 2 patients, Elevated liver enzymes (AST 85 U/L, ALT 76 U/L, ALP 144.8 U/L) and bilirubin (1.8 mg/dl) are consistent with liver dysfunction.

**Table 4. Distribution of patients according to anatomical site, size and volume of abscess in radiology**

Radiological findings	No. of cases / Mean	Percentage / SD
<i>Location</i>		
Right lobe	54	54
Left lobe	46	46
<i>Size</i>		
<5 cm	8	8
5-10 cm	82	82
>10 cm	10	10
<i>Volume of abscess (cc)</i>		
<100cc	18	18
>100cc	82	82

Right lobe of liver is most commonly involved (54%). The average size of abscess is 7.3 cm in most of patient (82%) are in between range of 5-10 cm of abscess cavity and least common (8%) in range of <5 cm of abscess cavity. Mean volume of abscess is  $145.1 \text{ cc} \pm 42.9 \text{ cc}$ , in that 82 patients have abscess volume of >100 cc, while the rest had a volume of <100 cc.

**Table 5. Distribution of patient according to management of liver abscess**

Treatment	Amoebic	Pyogenic	Total	p-value
Conservative	10 (50%)	10(50%)	20	0.028*
Needle aspiration	20 (43.47%)	26(56.52%)	46	
Pigtail catheterization	14 (41.17%)	20(58.83%)	34	
Total	44	56	100	

Most of patients (46%) are managed by needle aspiration in which 50 % amoebic pathology and 50% have pyogenic pathology. Thirty four percent are managed with Pigtail catheterization (41.17% amoebic and 58.83% have pyogenic pathology). And 20% managed conservatively. p value 0.028 statically significant.

**Table 6 . Distribution according to outcome of liver abscess management (n=100)**

Treatment outcome	Conservative	Pig-tailcatheter	Needle aspiration	p-value
Duration of stay (mean $\pm$ SD)	$10.5 \pm 2.1$	$9.3 \pm 2.5$	$7.8 \pm 1.8$	0.021*
Days to clinical improvement (mean $\pm$ SD)	$6.8 \pm 1.4$	$5.4 \pm 1.7$	$4.5 \pm 1.2$	0.001*
Days to 50% abscess reduction (mean $\pm$ SD)	$10.2 \pm 1.9$	$9.1 \pm 2.2$	$7.5 \pm 1.6$	0.045*

Duration of hospital stay is observed patients which manage conservatively is ( $10.5 \pm 2.1$  days on average) pigtail catheterization ( $9.3 \pm 2.5$ ) days and needle aspiration ( $7.8 \pm 1.8$  days) P value 0.021 is statically significant. Clinical improvement is observe in needle aspiration ( $4.5 \pm 1.2$  days) followed by pigtail catheterization ( $5.4 \pm 1.7$  days) and conservative management ( $6.8 \pm 1.4$  days) as P value 0.001 is statically significant. Fifty percent size reduction is observed in conservative management ( $10.2 \pm 1.9$  days) followed by pigtail catheterization ( $9.1 \pm 2.2$  days) and needle aspiration ( $7.5 \pm 1.6$  days). P value 0.045 is statically significant.

## DISCUSSION

The present study was undertaken to evaluate the sociodemographic profile, clinical characteristics, radiological features, management strategies, and outcomes of patients with liver abscess managed using different treatment modalities at a tertiary care center in India. Patients were categorized into three groups based on abscess size and volume in radiology



were managed conservatively, needle aspiration, and pigtail catheterization. Then outcomes were assessed using hospital stay duration, time to clinical improvement, and reduction in abscess cavity size.

The majority of patients in this study were older adults, with the highest proportion aged above 50 years, reflecting the increased prevalence of liver abscess in this age group. Similar age distributions have been reported by Yeh et al.<sup>16</sup> and Alam et al.<sup>17</sup>, who observed a higher incidence among middle-aged and elderly individuals. Advancing age is often associated with comorbidities such as diabetes mellitus and hepatobiliary diseases, which predispose individuals to infection.

A marked male predominance was observed, with males constituting 88% of the study population. This finding is consistent with multiple studies that report male predominance in liver abscess cases, including those by Dhaked et al.<sup>18</sup>, Kumar et al.<sup>19</sup>, Ghosh et al.<sup>20</sup>, Alam et al.<sup>17</sup>. Higher alcohol consumption, occupational exposure, and increased prevalence of chronic liver disease among males are likely contributors to this trend.

Socioeconomic status analysis revealed that most patients belonged to lower socioeconomic strata. Similar observations have been reported by Parihar et al.<sup>21</sup> and Dhaked et al.<sup>18</sup>, emphasizing the association between low socioeconomic status, poor sanitation, limited access to healthcare, and higher risk of liver abscess. These findings reinforce the role of environmental and socioeconomic determinants in the epidemiology of liver abscesses in developing regions.

Clinically, abdominal pain and fever were the most common presenting symptoms, observed in 96% and 92% of patients, respectively, with universal presence of abdominal tenderness. These findings align with reports by Yeh et al.<sup>16</sup>, Dhaked et al.<sup>18</sup>, Kumar et al.<sup>19</sup>, who identified fever and right upper quadrant pain as hallmark features of liver abscess. Tachypnea, noted in nearly half of the patients, indicated a systemic inflammatory response, a finding also corroborated by Dhaked et al.<sup>18</sup>. Less frequent symptoms such as cough and jaundice were observed, similar to findings reported by Parihar et al.<sup>21</sup>.

Laboratory investigations demonstrated anemia, leukocytosis, and elevated inflammatory markers, reflecting systemic infection. Similar hematological abnormalities have been reported by Ramachandran et al.<sup>22</sup>. Elevated liver enzymes (AST, ALT, and ALP) and raised bilirubin levels indicated hepatic inflammation and dysfunction, findings consistent with those reported by Alam et al.<sup>17</sup>. Low serum albumin levels observed in the study reflect impaired hepatic synthetic function and have been associated with more severe disease, as noted by Das et al.<sup>23</sup>.

Radiological assessment revealed a predominance of right lobe involvement, observed in 54% of cases. This finding concurs with studies by Ramachandran et al.<sup>22</sup> and Alam et al.<sup>17</sup>, who attributed right lobe predominance to its larger size and richer blood supply. The mean abscess size of 7.3 cm and volume of 145.1 cc suggest that many patients presented with large abscesses, which often necessitate invasive intervention. Larger abscess size has been shown to influence treatment decisions and outcomes, as reported by Das et al.<sup>23</sup>.

In terms of etiology, pyogenic abscesses were more prevalent than amoebic abscesses, although a significant proportion of amoebic liver abscesses was observed. This distribution mirrors findings by Gopal et al.<sup>34</sup> and Alam et al.<sup>33</sup> and reflects endemic parasitic infection patterns and sanitation conditions in the region.

Regarding management, needle aspiration was the most commonly employed modality, followed by pigtail catheterization and conservative management. Needle aspiration combined with antibiotics was particularly effective in abscesses smaller than 5 cm, consistent with observations by Gopal et al.<sup>24</sup> and Ghosh et al.<sup>20</sup>. Pigtail catheterization was preferred for larger abscesses or when conservative measures failed, offering the advantage of continuous drainage, as supported by Narwaria et al.<sup>25</sup> and Hathila et al.<sup>26</sup>. Conservative management was reserved for smaller abscesses and stable patients, particularly in amoebic liver abscess, as reported by Alam et al.<sup>17</sup>.

Outcome analysis demonstrated shorter hospital stays and faster clinical improvement with minimally invasive interventions. Amoebic liver abscesses showed quicker recovery compared to pyogenic abscesses, findings consistent with reports by Parihar et al.<sup>21</sup>. These results highlight the importance of early diagnosis, radiological assessment, and tailored management strategies based on abscess size, volume, and etiology, as emphasized by Yeh et al.<sup>16</sup>. Future studies should incorporate long-term follow-up and microbial analysis to better understand recurrence and resistance patterns. Strengthening public health interventions targeting sanitation, nutrition, and early access to care can further mitigate the burden of liver abscesses.

## CONCLUSION

Liver abscesses predominantly affect males above 50 years from lower socioeconomic backgrounds. Abdominal pain and fever are the most common symptoms. Radiological assessment is key to determining abscess size and volume, which in



turn guides appropriate treatment. Needle aspiration proves to be the most effective intervention for abscesses measuring 5–10 cm with 100 cc to 200 cc volume offering faster recovery and reduced hospital stay. Catheter drainage is reserved for larger collections, while conservative management is best suited for small abscesses. Timely diagnosis and stratified management based on clinical and radiological parameters are essential for reducing morbidity. Limitations of this study include the single-center design, relatively small sample size, and lack of microbiological data on causative organisms. Despite these, our data provides valuable insights into region-specific patterns and outcomes.

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