

## Original Research Article

# Correlation between abscess size and liver function tests in cases of liver abscess

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## ABSTRACT

**Background:** Liver abscess has shown a major change in demographics, etiology, diagnosis, and treatment over the past 100 years. The modern diagnostics like ultrasound and computed tomography to locate and drain the abscess have reduced the mortality to 2-12%. However, due to the complications of liver abscess especially the amoebic ones the morbidity is still high. This study aims to study the correlation of various LFT parameters with abscess volume for early detection of high risk patients and early treatment thus reducing morbidity.

**Methods:** The study was conducted over a period of 6 months on 50 patients of liver abscess. History and physical examination was done. All patients were subjected to complete hemogram, liver function test, coagulation profile (PT/INR) and USG abdomen. The data was recorded and compiled in excel sheets and analyzed using correlation coefficient (R) method.

**Results:** The mean age of the patients was 41.2 years with male preponderance. Amoebic liver abscess (88%) was predominant over pyogenic liver abscess (12%). Alcoholism (48%), smoking (42%) and diabetes mellitus (18%) are main predisposing factors in case of liver abscess. Hepatomegaly was found in 88% cases. Elevated ALP, low albumin, increased PT INR points to the diagnosis of liver abscess. Complications seen were pleural effusion (10%) and ascites (4%). On analysis, liver abscess size is significantly positively correlated with INR, ALP, liver enzymes, and negatively correlated with serum albumin level.

**Conclusions:** Liver abscess size was found to be positively correlated with INR and alkaline phosphatase (ALP), liver enzymes (SGOT, SGPT) and negatively correlated with serum albumin levels. There was no correlation of abscess size and bilirubin levels. Hence, LFT can be used to estimate the liver abscess size and predict the severity and prognosis of patient.

**Keywords:** ALP, INR, LFT, Liver abscess, SGOT, SGPT

## INTRODUCTION

Liver abscess is collection of purulent material in liver parenchyma. It is broadly classified as amoebic and pyogenic. It has shown a major change in demographics, etiology, diagnosis, and treatment over the past 100

years. While the mortality from liver abscess has decreased significantly since the early 20th century, the incidence appears to be increasing.<sup>1</sup> The risk factors for high prevalence of liver abscess in India are poor sanitation, overcrowding and inadequate nutrition. Pyogenic liver abscess (PLA) is a rare condition with significant prevalence in western countries, with a

reported annual incidence of 3.6 cases per 100,000 individuals in the United States, but up to 17.6 per 100,000 in Taiwan.<sup>1,2</sup>

The modern diagnostics like ultrasound and computed tomography to locate and drain the abscess have reduced the mortality to 2-12%. However, due to the complications of liver abscess especially the amebic ones the morbidity is still high.<sup>3,4</sup> The management of liver abscess has always been a dilemma for the clinicians, whether to perform a therapeutic aspiration or to treat conservatively.

This retrospective study is an attempt to understand the correlation of various LFT parameters with abscess volume. LFT parameters studied are alkaline phosphatase (ALP), serum albumin, INR, total serum bilirubin (SBT) and liver enzymes (SGOT, SGPT). These parameters can be associated with the disease severity and possible complications. This approach renders the opportunity for early detection of high risk patients and to start early treatment and thus reducing morbidity.

The objective of this study was to study the correlation between abscess volume and various LFT parameters in liver abscess patients.

**METHODS**

The data was obtained from records of patients treated for liver abscess in Department of General Medicine at our hospital in South Delhi, India over a period of 6 months. The study design and protocol were approved by the Hospital Research and Ethics Committee.

50 Patients who satisfied the inclusion criteria and those who gave written informed consent were selected for the study.

**Inclusion criteria**

- All consenting individuals with the age above 18 years
- Patients presenting with consistent symptoms of liver abscess
- Patients diagnosed with liver abscess radiologically (Ultrasonography/ CT Scan).

**Exclusion criteria**

- Patients not giving consent for the study.

Medical records were analyzed for demographic characteristics, underlying medical conditions, initial clinical manifestations, laboratory findings, imaging and microbial findings, treatment and overall morbidity and mortality.

Data was recorded on excel sheets and analyzed using correlation coefficient methods.

**Clinical, imaging and laboratory parameters**

Patient data was collected from records of all patients attending casualty and admitted as in-patients, irrespective of age/gender/ background and or/ socio-economic status. Detailed history of patients was noted and thorough clinical examination performed.

Laboratory parameters included complete hemogram, liver function tests (LFT's) which include alkaline phosphatase (ALP), serum albumin, total serum bilirubin (SBT) and liver enzymes (SGOT, SGPT), prothrombin time and INR, serology for amoebic antigen, stool for occult blood and other routine investigations like chest X-ray and ultrasound. The patient was followed up clinically every day. LFT and ultrasound abdomen was repeated every third day.

**Data analysis**

The data was recorded and compiled in excel sheets and analyzed using correlation coefficient (R) method. Correlation between volume/size and different LFT parameters (bilirubin, ALP, INR, liver enzymes and albumin) was studied. Resultant R value were correlated with following table to see the level of correlation (Table 1).

**Table 1: Correlation interpretation by value of R.**

Correlation Table : value of R		
	Positive	Negative
No correlation	0 to 0.1	0 to -0.1
Weak correlation exists	0.1 to 0.3	-0.1 to -0.3
Medium correlation exists	0.3 to 0.6	-0.3 to -0.6
Strong correlation exists	0.6 to 1	-0.6 to -1

**RESULTS**

Out of 50 patients who fulfilled the inclusion criteria, 40 (80%) were males and 10 (20%) were females with the mean age of presentation being 41.24 years (range: 18-68 years) (Table 2). In our study, we observed that 88% had amoebic (n=44) and 12% had pyogenic (n=6) type of abscess. This was based on amoebic serology and pus culture analysis.

**Table 2: Demographic profile of liver abscess patients.**

		Cases
Average age		41.24
Age range		18-68
Sex	Male	40
	Female	10

The common risk factors seen were alcohol (48%), smoking (42%) and diabetes (18%). 8% cases had both DM and history of alcoholism (Table 3).

**Table 3: Risk factor profile of patients.**

Risk factors	Cases
Alcohol	24 (48%)
Smoking	21 (42%)
DM	9 (18%)
Alc+DM	4 (8%)

The commonest presenting clinical feature was fever (96%) and pain in abdomen (92%). On examination, hepatomegaly (88%) and abdominal tenderness (64%) were the most common findings. Clinical complications were rare, 10% cases had right sided pleural effusion while ascites was seen in 4% cases (Table 4).

**Table 4: Clinical features and complications.**

Signs and symptoms	Cases
Fever	48 (96%)
Pain abdomen	46 (92%)
Vomiting	10 (20%)
Nausea	24 (48%)
Jaundice	4 (8%)
Cough	12 (24%)
Abdominal tenderness	32 (64%)
Hepatomegaly	44 (88%)
Anorexia	23 (46%)
Pleural effusion	10 (20%)
Ascitis	2 (4%)

LFT parameters were studied and then compared with abscess cavity size. Most common abnormality in LFT was elevated ALP levels which was seen in 47 (94%) patients. Serum albumin was low in 45 patients (90%) whereas INR was deranged in 30 patients (60%). SGOT and SGPT were elevated in 26 (52%) and 27 (54%) patients respectively (Table 5).

**Table 5: LFT profile of patients.**

Biochemical parameters	Cases (total =50)
ALP>100	47 (94%)
SGOT>45	26 (52%)
SGPT>45	27 (54%)
Albumin<3.5	45 (90%)
INR>1.2	30 (60%)
Total bilirubin>1.2g/dl	17 (34%)

**Table 6: USG findings.**

Size	Cases
<200 CC	23 (46%)
200-400 CC	17 (34%)
>400	10 (20%)

On ultrasonography 27 cases had an abscess volume of more than 200 cc (Table 6).

**Table 7: Statistical analysis of LFT parameters with abscess volume.**

Biochemical parameters	Correlation coefficient(R)	Inference
Total bilirubin	0.073	No correlation
Alkaline phosphatase	0.40	Medium correlation
INR	0.54	Medium correlation
SGOT	0.41	Medium correlation
SGPT	0.39	Medium correlation
Albumin	-0.28	Negative correlation

Statistical analysis showed significant positive correlation between abscess volume and INR (R=0.54), Alkaline phosphate (R=0.40), SGOT (R=0.41), SGPT(R=0.39) and a negative correlation with serum albumin levels (R=-0.28). There was no significant correlation between abscess size and total bilirubin level (R=0.073) (Table 7).

**DISCUSSION**

Liver abscess is more common in tropical countries.<sup>5,6</sup> E.histolytica (amoebic) and bacteria (pyogenic) are most frequently observed microbiological organisms causing liver abscess. In this study, amoebic etiology is seen in more than three-fourth of cases which is in concordance with various studies in developing countries.<sup>6</sup>

The mean age of presentation was 41.24 years which was also seen in various other Indian studies. Ghosh et al, Sharma et al and Mukhopadhyay et al, reported it to be 41, 40.5 and 43.64 years, respectively.<sup>7-9</sup> In this study, PLA was distributed equally among all age groups whereas highest incidence of amebic liver abscess was seen in fifth decade of life.

In present study, there was a definite male preponderance (40 males, 10 females). Similar pattern in sex distribution was also observed in Sharma et al, Mukhopadhyay et al and Ghosh et al, who reported male to female ratio to be 14.4:1, 7:1 and 11:1, respectively.<sup>7-9</sup> However, Pang et al and Heneghan et al reported it to be 2:1 and 1.22:1, respectively.<sup>10-12</sup>

In present study, alcohol was found to be a major risk factor as 48% cases were alcoholic. Ghosh et al had 72% alcoholic patients in their study.<sup>9</sup>

Alcohol has a multifactorial effect on development of liver abscess. It suppresses functions of Kupffer cells which help in clearing amoeba from the liver. Also, a high content of free iron is present in country liquor which predisposes to invasive amobeiasis.<sup>13</sup>

Apart from alcohol, diabetes mellitus was seen in 18% cases. This incidence was different in various studies. Ghosh et al reported it to be 9% whereas Das et al reported in 70% patients.<sup>9,14</sup> In a study by Thomsen et al, diabetic patients had a 3.6-fold increased risk of developing PLA, when compared with non-diabetic subjects.<sup>15</sup>

In this study, the presenting feature was fever in 96 % cases along with pain in abdomen which was seen in 92% cases. It is similar to the results seen in study conducted by Ghosh et al and various other studies.<sup>7-9</sup> Ghosh et al reported hepatomegaly in 89% cases which correlates with our study (88%). However, this result differs from Das et al who found hepatomegaly in only 40% cases.<sup>9,14</sup>

The major laboratory findings in our study were raised levels of alkaline phosphatases, increased INR and hypoalbuminemia.

Abnormally high ALP was seen in 94% cases. Thus, alkaline phosphatase level can be considered as the most reliable and consistent biochemical indicator. Similar findings were reported by Shyama et al., Satish et al. and Kemparaj et al, in their studies.<sup>16-18</sup> It is considerably correlated with abscess volume in this study (R=0.4). Katzenstein et al suggested that the value of alkaline phosphatase is correlated with duration of the disease. It was seen that rise in alkaline phosphatase was more common in patients with a chronic disease as compared to patients presenting with an acute illness.<sup>19</sup>

An elevated INR is seen in 60% patients in this study. It showed maximum correlation with abscess volume (R=0.54) when compared with all other parameters.

SGOT, SGPT were also mildly raised in 52% and 54% patients and their correlation coefficients are 0.41 and 0.39 respectively indicating remarkable correlation with abscess volume. The abnormal values of SGOT, SGPT indicates the severity of the disease. Similar findings were reported in various other studies.<sup>16-18</sup>

A decline in serum albumin was a consistent factor in our study. There were 45 (90%) cases of hypoalbuminemia which had a significant negative correlation with the abscess volume i.e. lower the serum albumin level greater will be the abscess volume.

Serum bilirubin was mildly raised in our series with 34% incidence but showed no correlation with abscess volume. Kemparaj et al, reported 35% cases with hyperbilirubinemia.<sup>18</sup> Mechanism of hyperbilirubinemia in amoebic liver abscess has been studied previously in many studies. Various mechanisms were suggested like pressure on biliary ducts at the porta hepatis especially by large abscess.<sup>20</sup>

In a prospective study, Sharma et al considered multiple factors like bilirubin level >3.5 mg/dL, encephalopathy,

volume of abscess cavity, hypoalbuminemia (serum albumin level <2.0 g/dL), and the number of abscesses as the independent risk factors for mortality.<sup>21</sup> In the present study, we have seen that volume size is positively correlated with increase in INR, ALP, SGOT and SGPT, whereas it is negatively correlated with serum albumin.

## CONCLUSION

Liver abscess is a very important clinical entity especially for developing countries like India. An early diagnosis and a prompt management is necessary to reduce morbidity in this disease.

The size of abscess is one of the most important prognostic factor, others being site of the abscess (left versus right lobe of liver), distance from the capsule, comorbid conditions in the patient, features of sepsis and multi organ dysfunction.

So, in this study, a correlation between abscess size and various LFT parameters were studied.

In this study, observed a significant positive correlation between abscess size and INR, alkaline phosphatase, and liver enzymes (SGOT, SGPT). Study also found a significant negative correlation between abscess size and serum albumin levels. However, there was no correlation of abscess size and total bilirubin levels.

LFT which is a simple, cost effective and reliable test can help clinicians predict the size of abscess and hence the severity and prognosis of the patient.

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## REFERENCES

1. Meddings L, Myers RP, Hubbard J, Shaheen AA, Laupland KB, Dixon E, et al. A population-based study of pyogenic liver abscesses in the United States: incidence, mortality, and temporal trends. *Am J Gastroenterol.* 2010;105:117-24.
2. Tsai FC, Huang YT, Chang LY, Wang JT. Pyogenic liver abscess as endemic disease, Taiwan. *Emerg Infect Dis.* 2008;14:1592-600.
3. Ribaud JM, Ochsner A. Intrahepatic abscesses: amebic and pyogenic. *Am J Surg.* 1973;125:570-4.

4. Rahimian J, Wilson T, Oram V, Holzman RS. Pyogenic liver abscess: recent trends in etiology and mortality. *Clin Infect Dis.* 2004;39:1654-9.
5. Channanna C, Rehman FU, Choudhuri B, Patil A. A clinical study, diagnosis and management of Liver Abscess at VIMS, Bellary. *J Evidence Based Med Health Care.* 2014;1:668-85.
6. Ochsner A, DeBakey M, Murray S. Pyogenic abscess of the liver: II. An analysis of forty-seven cases with review of the literature. *Am J Surg.* 1938;40(1):292-319.
7. Sharma N, Sharma A, Varma S, Lal A, Singh V. Amoebic liver abscess in the medical emergency of a North Indian hospital. *BMC Res.* 2010;3(1):21.
8. Mukhopadhyay M, Saha AK, Sarkar A, Mukherjee S. Amoebic liver abscess: presentation and complications. *Indian J Surg.* 2010;72(1):37-41.
9. Ghosh S, Sharma S, Gadpayle AK, Gupta HK, Mahajan RK, Sahoo R, et al. Clinical, laboratory, and management profile in patients of liver abscess from Northern India. *J Trop Med.* 2014;2014:1423-82.
10. Pang TC, Fung T, Samra J, Hugh TJ, Smith RC. Pyogenic liver abscess: an audit of 10 years' experience. *World J Gastroenterol.* 2011;17:162230.
11. Heneghan HM, Healy NA, Martin ST, Ryan RS, Nolan N, Traynor O, et al. Modern management of pyogenic hepatic abscess: a case series and review of the literature. *BMC Res Notes.* 2011;4(1):80.
12. Mohsen AH, Green ST, Read RC, McKendrick MW. Liver abscess in adults: ten years experience in a UK centre. *QJM.* 2002;95(12):797-802.
13. Makkar RP, Sachdev GK, Malhotra V. Alcohol consumption, hepatic iron load and the risk of amoebic liver abscess: a case-control study. *Intern Med.* 2003;42(8):644-9.
14. Das AK, Moni Saikia A, Moyee Saikia A, Dutta N. Clinico-epidemiological profile of patients with liver abscess: a hospital based study. *Indian J Basic Applied Med Res.* 2015;5(1):17-25.
15. Thomsen RW, Jepsen P, Sørensen HT. Diabetes mellitus and pyogenic liver abscess: risk and prognosis. *Clin Infect Dis.* 2007;44(9):1194-201.
16. Satish KR, Sathyanarayana BA, Madhu SL. A study of predictors for identification of risk of complications in patients with liver abscess. *Trop Gastroenterol.* 2015;36:96-100.
17. Mathur S, Gehlot RS, Mehta A. Liver abscess. *J Indian Academy Clin Med.* 2002;3:78-9.
18. Kemparaj T, Khan MR, Narayan S. Liver abscess presentation and management: a retrospective study. *Int Surg J.* 2017;4:550-4.
19. Katzenstein D, Rickerson V, Abraham B. New concepts of amoebic liver abscess derived from hepatic imaging, serodiagnosis and hepatic enzymes in 67 consecutive cases in San Diego. *Med.* 1982;61:237-46.
20. Kumar AS, Mishra A, Malhotra N, Alpana M. Hyperbilirubinemia in patients with amoebic liver abscess: a study of 75 cases. *J Gastroint Dig Syst.* 2013;3:138.
21. Dudeja V, Fong Y. The Liver. In: Townsend CM, Evers BM, Beauchamp RD, Mattox KL. *Sabiston textbook of Surgery.* 20<sup>th</sup> edition. Philadelphia: Elsevier; 2016:1418-1481.

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