

## Correlation of the Size of Liver Abscess and Liver Function Test: An Experience at our Institution

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### Abstract

**Introduction:** Liver abscess is the collection of pus within the liver parenchyma. It is the most common cause of intra-abdominal visceral abscess. Though ultrasonography has been used for diagnosing liver abscesses, other hematological investigations, such as total counts, and liver function tests have often been useful aids in diagnosis and planning the management. These may also provide a basis for early detection of the condition and serve as a tool for prediction of the prognosis of the condition. This study aims at identifying the correlation between the size of the liver abscess and liver function tests.

**Methodology:** This was a prospective observational study conducted at Victoria hospital between April and June 2019. Fifty patients between the ages of 18-60 presenting to emergency and diagnosed as having liver abscess were included in the study and were subjected to ultrasonography and routine investigations. Details such as etiology, leukocyte counts, liver function tests including albumin levels, levels of enzymes such as ALT, AST and ALP were noted and tabulated and analyzed. The correlation between the variables was calculated by using the Pearson's coefficient. A *p*-value of <0.01 was considered statistically significant.

**Results:** 34 (68%) of the 50 patients were male while 16 (32%) of the 50 patients were females. 36 (72%) of

the patients had amoebic liver abscess while 14 (28%) had pyogenic liver abscess. The greatest dimension of the liver abscess was in the range of 4-10 cm with a mean of  $6.9 \pm 1.38$  cm. The total leukocyte counts of the 50 patients included in the study ranged from 10,300-32,100 cells/mm<sup>3</sup> (mean  $21627 \pm 4994$ ). Serum albumin levels ranged between 1.8-3.2 mg/dL, with a mean of  $2.57 \pm 0.3$  mg/dL. AST ranged from 33-99 (mean of  $70.4 \pm 15.76$ ), ALT from 29-110 (mean  $70.96 \pm 16.15$ ) and ALP between 45-190 (mean  $110.1 \pm 41.68$ ).

**Conclusion:** Total leukocyte counts, AST, ALT and ALP showed a positive correlation with the size of liver abscess whereas serum albumin showed a negative correlation with the size of liver abscess.

**Keywords:** Liver abscess; Correlation with LFT; Hypoalbuminemia; Leukocytosis.

### Introduction

Liver abscess is the collection of pus within the liver parenchyma. It is of two types: pyogenic and amoebic liver abscess. The pyogenic liver abscess was first described in 4000 BC<sup>1</sup> and the amoebic liver abscess in 5000 BC by Hippocrates. Since then it has been extensively studied, and has been described as the most common cause of intra-abdominal visceral abscess.<sup>2</sup> The annual incidence of liver abscess has been estimated at 2.3 cases per 100,000 people and is higher among men than women.<sup>3</sup> A case fatality rate of 9.1 percent was reported among patients with pyogenic liver abscess by SC Chen et al. in their study.<sup>4</sup> A case fatality rate of 6% was reported by H Dimopoulou et al., who also noted that hyperbilirubinemia, use of antibiotics

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alone and bilobar involvement were associated with increased mortality.<sup>5</sup> Low social economic status and alcohol consumption are implicated as predictors of amoebic liver abscess.<sup>6</sup>

Traditionally, though ultrasonography has been used for diagnosing liver abscesses, other hematological investigations, such as total counts, and liver function tests have often been useful aids in diagnosis and planning the management. Leukocytosis is present in 70% to 90%, an elevated alkaline phosphatase in 80%, and an elevated bilirubin and transaminases in 50% to 67% of patients. Anemia, hypoalbuminemia, and prolonged prothrombin time are seen in 60% to 75% of patients.<sup>1</sup> These may also provide a basis for early detection of the condition and serve as a tool for prediction of the prognosis of the condition. This study aims at identifying the correlation between the size of the liver abscess and liver function tests.

## Materials and Methods

- *Study design:* This was a prospective observational study
- *Study period:* The study was conducted between the months of April and June 2019
- *Place of study:* The study was conducted at Victoria hospital, Bangalore.
- *Patient selection:* Adult patients presenting to emergency at Victoria hospital, fulfilling the following criteria were included in the study

### Inclusion Criteria

- Patients between the ages of 18–60
- Patients with sonologically proven liver abscess

### Exclusion Criteria

- Patients not consenting for participation in the study
- Patients with evidence of rupture of liver abscess

## Methodology

After obtaining formal consent, 50 patients satisfying the inclusion criteria were included in the study. Their details were collected, such as name, age, sex. They were subjected to routine investigations and the details such as etiology, leukocyte counts, liver function tests including

albumin levels, levels of enzymes such as ALT, AST and ALP were noted and tabulated in Microsoft's Excel. These details were then analyzed with SPSS 25 software. The results were described using descriptive statistics such as mean and standard deviation. The correlation between the variables was calculated by using the Pearson's coefficient. A *p*-value of <0.01 was considered statistically significant.

## Results

The 50 patients enrolled in the study had ages in the range of 31–60 years, with a mean of  $45.64 \pm 8.24$  years. Most of the patients had ages between 41–50 years. 34 (68%) of the 50 patients were male while 16 (32%) of the 50 patients were females (Fig. 1).

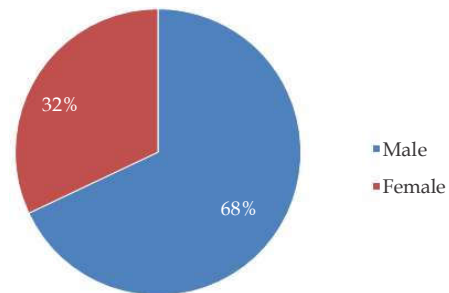


Fig 1: Sex distribution of patients.

On analysis of the type of the liver abscess, it was found that 36 (72%) of the patients had amoebic liver abscess while 14 (28%) had pyogenic liver abscess (Fig. 2).

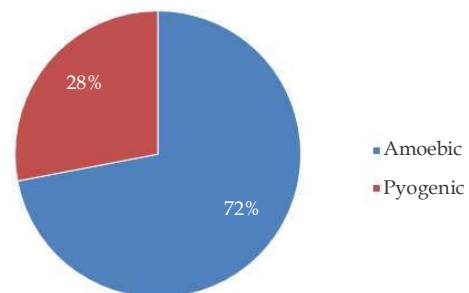


Fig. 2: Analysis of type of liver abscess.

Analysis of the greatest dimension of the liver abscess revealed that it was in the range of 4–10 cm with a mean of  $6.9 \pm 1.38$  cm. 8 (16%) of the 50 patients had the greatest dimension of the abscess less than 5 cm while majority (42, i.e., 84% patients) had the greatest dimension of liver abscess between 6 and 10 cm (Table 1).

**Table 1:** Analysis of the size of liver abscess

Largest dimension (cm)	Number of patients	Percentage	Range	Mean $\pm$ SD
1-5	8	16	4-10	6.9 $\pm$ 1.38
6-10	42	84	cm	

The total leukocyte counts of the 50 patients included in the study ranged from 10,300–32,100 cells/mm<sup>3</sup>. The mean total leukocyte count was 21627, with a standard deviation of 4994. The total leukocyte count showed a statistically significant positive correlation to the size of the liver abscess (Pearson's coefficient = 0.943). The liver function test was also analyzed for each component and the variation was compared with the size of the liver abscess. It was found that the serum albumin levels of the patients ranged between 1.8–3.2 mg/dL, with a mean of 2.57  $\pm$  0.3 mg/dL. This showed a negative correlation to the size of the liver abscess, with a Pearson's coefficient of -0.323 (Table 2).

**Table 2:** Statistical analysis of correlation between abscess size and LFT

Parameter	Pearson's coefficient
Total leukocyte counts	0.943
Albumin	-0.323
AST	0.723
ALT	0.825
ALP	0.723

Analysis of the liver enzymes revealed that AST ranged from 33–99 (mean of 70.4  $\pm$  15.76), ALT from 29–110 (mean 70.96  $\pm$  16.15) and ALP between 45–190 (mean 110.1  $\pm$  41.68).

These showed positive correlation to the size of liver abscess (Pearson's coefficient values being 0.877, 0.825 and 0.723 respectively).

## Discussion

Traditionally, though ultrasonography has been used for diagnosis of liver abscesses, the measurement of other hematological parameters such as total leukocyte counts, and liver function tests aids in the diagnosis of liver abscess. These can also have prognostic implications.

In this study, we found a male predisposition, with 68% of patients being males. This is consistent with the findings by other authors. Ershad et al.<sup>7</sup> in their study 'Management of Liver Abscess: An institutional experience' noted a male to female ratio of 48:6. Vineet Jain<sup>8</sup> et al., in their study 'Correlation between Abscess size and Liver function tests in

case of Liver abscesses' had 80% of their patients as males. The male predisposition could be due to the higher prevalence of alcoholism among males. In our study, middle aged patients (41–50 years) were affected more. The study by Ershad et al.<sup>7</sup> had maximum number of patients in the age group between 35–45 years.

Analysis of the type of liver abscess revealed that 72% patients had amoebic liver abscess while 28% had pyogenic liver abscess. This is consistent with the findings of Soumik Ghosh et al.<sup>9</sup> who reported 71% patients having amoebic liver abscess. Amitesh Kumar Jha et al.<sup>10</sup> reported 88% patients as having amoebic liver abscess in their study. This could be due to the high prevalence of amoebiasis in developing countries like India.

The mean size of liver abscess was found to be 6.9  $\pm$  1.38 cm (range 4–10 cm). The mean total count 21627  $\pm$  4994, mean serum albumin levels 2.57  $\pm$  0.3, mean AST 70.4  $\pm$  15.76, mean ALT 70.96  $\pm$  16.15 and mean ALP 110.1  $\pm$  41.68. Of these, total counts, AST, ALT and ALP showed a positive correlation with the size of liver abscess, while serum albumin showed a negative correlation with the size of the abscess. This is consistent with the findings of Vineeth et al.<sup>8</sup> who also reported a positive correlation between the size of the liver abscess and AST, ALT and ALP and a negative correlation with serum albumin. Soumik Ghosh et al.<sup>9</sup> also reported raised leukocyte levels and low serum albumin levels among patients with liver abscess.

Martin Sánchez Aguilar et al.<sup>11</sup> reported that a serum albumin level <3 mg/dL, diameter >10 cm and ALP >300 had a sensitivity of 0.75 and specificity of 1 in predicting failure of treatment of liver abscess.

## Conclusion

Total leukocyte counts, AST, ALT and ALP have a positive correlation with the size of liver abscess while serum albumin has a negative correlation with the size of liver abscess.

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