

Correlation of Serum Leptin Serum Albumin and Haemoglobin with Outcome in Patients of Amoebic Liver Abscess

Dr. Shabi Ahmad¹, Dr. Ashish Kumar Yadav², Dr. Prakhar Pratap³, Dr Lalit Kumar⁴,
Dr Dhruv Chandra⁵

¹Professor, Department of Surgery, Motilal Nehru Medical College, Prayagraj, Uttar Pradesh, India

²Resident, Department of Surgery, Motilal Nehru Medical College, Prayagraj, Uttar Pradesh, India (Corresponding Author)

^{3,4,5}Resident, Department of Surgery, Motilal Nehru Medical College, Prayagraj, Uttar Pradesh, India

Abstract: *Background:* Amoebic liver abscess (ALA) is the third prime cause of parasitic infections related death. Management of ALA depends on size of abscess, segment/lobe of liver involved, complication of amoebic liver abscess, condition of patients and signs of peritonitis. Study aims to establish correlation of Serum Leptin, Serum Albumin and Haemoglobin with outcome in patients of Amoebic Liver Abscess. *Methods:* This Prospective observational study carried out in Department of Surgery M.L.N. Medical College, Prayagraj. The diagnosis of Amoebic liver abscess was confirmed by serology. *Results:* In our study out of total 64 patients, 90.62% were males and 9.37% were females. Male to female ratio was 10.6:1. Mean age was 36.21±11.58. In our study 56 cases (87.5%) abscesses were located in right lobe of liver and 4 (6.25%) were located in left lobe of liver and remaining 4 (6.25%) located in both lobe of liver. In our study patients with S.albumin > 3gm/dl, 75% uncomplicated cases and 25% complicated cases of ALA was noticed whereas patients with serum albumin (<3gm/dl), 25% uncomplicated cases and 75% complicated cases of ALA noticed and longer duration of hospital stay was noticed with low serum albumin. Duration of hospital stay and complication of amoebic liver abscess patients with normal Serum Leptin was less in comparison to low Serum Leptin level patients. *Conclusions:* Amoebic liver abscess patients with low serum albumin, serum leptin and low haemoglobin levels had more complication rate and longer duration of hospital stay.

Keywords: Amoebic Liver abscess, Serum Leptin, Serum Albumin

1. Introduction

Amoebic liver abscess is defined as an inflammatory space occupying lesion of the liver caused by a parasite of human gastrointestinal tract *E. histolytica*. It is the third prime cause of parasitic infections related death worldwide.⁽¹⁾ Out of all the cases of amoebiasis the incidence of ALA has been reported in the range of 3% to 9%.⁽²⁾

Out of total incidence of liver abscess approximately two third cases in developing countries are amoebic verity and three fourths cases in developed countries are pyogenic.⁽³⁾

Detection of *Entamoeba histolytica* trophozoites in pus and antibodies in the serum makes definitive diagnosis⁽⁴⁾ of amoebic liver abscess. USG, CECT Scan and MRI of abdomen are outstanding methods for detecting amoebic liver abscess but all are nonspecific.⁽⁵⁾

In ultrasonography of abdomen classic appearance is non-homogenous hypoechoic, round or oval mass with well-defined borders, single right lobe lesion in 70-80%, left lobe lesion in 10% and remaining are multiple lesion, but only 40% patients have typical appearance in USG, *amoebic liver abscess* resolves completely within two years. Detection of protein antigen in feces or serum by IgG/IgM antibodies, detection of parasitic DNA by PCR amplification and use of nucleotide probe. ELISA Kit that uses monoclonal antibodies directed against amoebic adherence leptin are also used for clinical diagnosis.⁽⁶⁾ Amoebic Leptin antigen

detection sensitivity are >95% if done before giving metronidazole treatment.

Serum antibodies are positive in 99% of patients with amoebic liver abscess and 85% with invasive colitis.⁽⁶⁾

Management of amoebic liver abscess depends on size of abscess, segment/lobe of liver involved, uncomplicated or complicated amoebic liver abscess and condition of patients (vitality stable/unstable) and signs of peritonitis.

2. Aims and Objectives

Correlation of serum leptin, serum albumin and haemoglobin with outcome in patients of amoebic liver abscess with respect to

- 1) Mortality
- 2) Morbidity
 - a) Length of Hospital Stay
 - b) Incidence of Complications of Liver abscess

3. Materials and Methods

The present Prospective observational study titled 'Correlation of Serum Leptin, Serum Albumin and Haemoglobin with Outcome in Patients of Amoebic Liver Abscess' was carried out in department of surgery M.L.N. Medical College Prayagraj

Inclusion Criteria

- Patients presenting with Clinical features of liver abscess and confirmed by abdominal ultrasound.
- All diagnosed cases of amoebic liver abscess usually single large abscesses or 2-3 smaller abscesses in the liver with positive serology.

Exclusion Criteria

- Patients of pyogenic and fungal liver abscess.
- Patient not ready to participate in study.
- Patient absconded during the study
- Patient unable to understand about study and unable to give consent

Laboratory investigations and culture of aspirate done to rule out pyogenic liver abscess. CECT abdomen was done two doubtful cases.

The diagnosis of Amoebic liver abscess was confirmed by serology. Indirect hem- agglutination and gel diffusion precipitation were used with high sensitivity and specificity. IgG ELISA of all 64 (100%) patients was positive with high titer.

Medical Management

Indicated for multiple abscesses less than 5cm in size or less than 100cc We advised metronidazole 750 mg orally or intravenously thrice daily for 10 days. Response was noticed within 72 hours of initiation of metronidazole treatment. Patient who was not responding or had drug intolerance, emetine chloride was given. If no clinical response was noticed within 3 to 5 days after initiation of treatment aspiration of abscess was advised under Ultrasonography for diagnosis and antibiotics was prescribed on basis of culture and sensitivity report of aspirates.

Percutaneous aspiration (PA)

Indicated in multiple small (5- 10 cm), superficial and liquefied abscess. PA was skilled by placing a 18G spinal needle after local anesthesia infiltration under ultrasonography guidance and after proper informed valid written consent taken. of liver under Ultrasonography. Pus was aspirated till no more pus could be aspirated further sample of aspirates was send for culture sensitivity.

Percutaneous catheter drainage (PCD)

Indicated for single large (>10 cm) partially liquefied and deep seated abscess. PCD was skilled by placing a 14 Fr(12 to 16 Fr) pig tail catheter in abscess cavity of liver under Ultrasonography using Seldinger technique under local anesthesia infiltration after proper valid written consent. Patients not responding to catheter drainage, surgical drainage was indicated.

Surgical Drainage

Done in patients in which liver abscess was ruptured with sign of peritonitis or previous attempts of drainage was not successful either via laparotomy or laparoscopy technique.

Laparotomy was performed via trans peritoneal approach for abscess drainage or identifying undetected abscess.

Laparoscopy can be performed in same patients instead of laparotomy if available in emergency.

Metronidazole 750mg oral or intravenous was given to all patients for 10 days, metronidazole treatment should be followed with paromomycin or diloxanidefuroate to cure luminal infection of bowel.

Follow up

We counseled the ALA patients and their attendants for regular follow up. The patients were called in OPD weekly in first month and monthly for next three months and at the completion of 6 months, for clinical assessment and assessment of any residual collections using routine blood investigation and ultrasonography in abscess cavity until complete resolution of abscess was attained. Drain was retained until the output less than 10cc/day.

Data collection was done manually as documented in the printed proforma by the investigator and attached in thesis.

All the cases included in the study were analyzed statistically by using chi square test, chi square with Yates correction, and Fisher exact test and result was compared with standards available in healthy controls.

4. Observation and Results

A total of 64 patients of amoebic liver abscess were included our study.

Table 1: Gender distribution of patients

Gender	Number of ALA patients	Percentage
Male	58	90.62
Female	6	9.37
Total	64	100

Table 2: Age distribution of patients

Age groups	Male	Female	Total
0-20 year	6 9.37%	2 3.12%	8 12.5%
20-40year	44 68.75%	4 6.25%	48 75%
40-60year	8 12.5%	0 -	8 12.5%

Most common manifesting symptoms of ALA was pain in right upper quadrant, present in all patients (100%) followed by rest of the complaints as illustrated below.

Table no.3:- Symptoms distribution of patients

Symptoms	Present		Absent	
	No.	%age	No.	%age
Fever	44	68.75%	20	31.25%
Right upper quadrant pain	64	100%	0	0%
Malaise	28	43.75%	36	56.25%
Weight loss	20	31.25%	44	68.75%
Nausea	22	34%	42	65.62%
Vomiting	20	31.25%	44	68.75%
Diarrhoea	10	15.62%	54	84.44%
Cough/breathlessness	10	15.62%	54	84.44%

Most common clinical sign was tenderness in right upper quadrant present in 56(87.5%) patient and other were hepatomegaly present in 52(81.25%) patient, pallor in 26(40.6%)patient, pleural effusion in 10(15.62%)patient and abdominal distension was appreciated in 14(21.8%) patient.

Table 4: Liver lobe involvement by Ultrasonography Finding

USG Findings	No. of ALA Patients	Percentage
Right lobe liver abscess	56	87.5%
Left lobe liver abscess	4	6.25%
Both lobe involved	4	6.25%
TOTAL	64	100%

In our study most of cases of amoebic liver abscess (84.37%) solitary liver abscess was noticed and in 15.62% cases multiple small liver abscess were noticed.

Table 5: Solitary /multiple amoebic liver abscesses

Solitary /multiple	No of ALA patients	Percentage
Solitary right	50	78.12%
Solitary left	4	6.25%
Multiple abscess (2-3)	10	15.62%
Total	32	100%

Table 6: Size of Abscess Cavity

Size of Abscess Cavity	No of ALA patients	Percentage
< 5 cm	8	12.5%
5 - 10 cm	32	50%
> 10 cm	24	37.5%
Total	64	100%

Management

Table 7: Procedures in patients with amoebic liver abscess

Procedures	No. of Patients	Percentage
Medical Management	8	12.5%
Percutaneous Aspiration	16	25%
Percutaneous drainage	16	25%
Percutaneous drainage+ ICD	10	15.63%
Surgical Treatment	Laparotomy	21.87%
	Laparoscopic	
Total	64	100.0%

Among the 16 patients who were treated by percutaneous aspiration of liver abscess cavity, 12 patients needed single time aspiration whereas four patients were aspirated for the residual abscess cavity twice.

Complications of Amoebic Liver Abscess

Out of 64 patients of ALA, 24(37.5%) had complications out of which 14 (21.87%) patients had rupture in peritoneal cavity and 10 (15.6%) had ruptured in pleural cavity.

Table 8: Complications of amoebic liver abscess

Complications of Liver abscess	No. of Patients	Percentage
Peritoneal rupture	14	21.87%
Pleural rupture	10	15.6%
Total	24	37.5%

Table 9: Anemia in amoebic liver abscess

Hemoglobin	No of ALA patients	Percentage
<12g/dl	48	75%
>12g/dl	16	25%
Total	64	100%

Table 10: Correlation between Haemoglobin Level And Hospital Stay

Hemoglobin	Hospital stay < 2 weeks		Hospital stay > 2 weeks		P Value
<12g/dl	18	60%	30	88.23%	P=.00200672
>12g/dl	12	40%	4	11.77%	
Total 64	30	100%	34	100%	

NOTE:- P=.00200672 the chi-square with Yates correction is 5.3542 *significant at p<0.05

Table 11: Correlation Between Haemoglobin Level And Complicated Liver Abscess

Hemoglobin	Uncomplicated cases		Complicated cases		P value
<12g/dl	26	65%	22	91.67%	P=0.036888
>12g/dl	14	35%	2	8.33%	
Total 64	40	100%	24	100%	

Note- P=0.036888 the chi-square with Yates correction is 4.3556 *significant at p<0.05

In amoebic liver abscess patients with serum albumin > 3g/dl, 75% uncomplicated cases and 25% complicated cases of ALA was found and in those with low serum albumin (<3g/dl) 25% uncomplicated and 75% complicated cases of amoebic liver abscess were noticed. Higher frequency of complication was noticed in low serum albumin patients that were found statistically significant.

Table 12: Serum albumin with amoebic liver abscess

Serum albumin	Male	Female
>3 gm/dl	26 44.82%	2 33.33%
<3 gm/dl	32 55.17%	4 66.66%

Table 13: Correlation Serum albumin with complications

Serum albumin	Uncomplicated amoebic liver abscess		Complicated amoebic liver abscess		P value
>3g/dl	30	75%	6	25%	P=.000269
< 3g/dl	10	25%	18	75%	
Total 32	40	100%	24	100%	

NOTE- P=.000269 the chi-square with Yates correction is 13.2741 *significant at p<0.05

Table 14: Correlation of Serum albumin with hospital stay

Serum albumin	Hospital stay < 2 weeks		Hospital stay > 2week		P value
>3g/dl	28	77.77%	8	28.57%	P=.000705
< 3g/dl	10	22.23%	20	71.42%	
Total 64	38	100%	28	100%	

NOTE- P=.000705 the chi-square with Yates correction is 11.4761 *significant at p<0.05

Most patient of ALA patient had low Serum Leptin. Normal value of Serum Leptin for male -2.05-5.63 ng/ml and for female 3.63-11.09ng/.

In our study only 8 (12.5%) patients had normal Serum Leptin and 56 (87.5%) had low Serum Leptin.

Table 15: Serum leptin in amoebic liver abscess

	No. of Ala Patients	Percentage
Normal Leptin	8	12.5%
Low Leptin	56	87.5%
Total	64	100

In patients having normal Serum Leptin there were 7.14% uncomplicated cases of ALA and 50% case of complicated ALA was noticed and 92.86% uncomplicated cases of ALA and 50% complicated cases of ALA were found in low Serum Leptin patients.

Table 16: Serum Leptin with complications

Serum Leptin	Uncomplicated cases	Complicated cases	P value
Normal	2	7.14%	P=.019172
Below normal	38	92.86%	
Total 64	40	100%	

NOTE- P=.019172 the chi-square is 5.4857 *significant at p<0.05

Table 17: Correlation between Serum Leptin Level and Hospital Stay

Serum Leptin	Hospital stay		P value
	< 2 weeks	> 2week	
Normal	30	78.94%	P<.000001
Below normal	8	21.06%	
Total 64	38	100%	

NOTE- P<.000001 the chi-square with Yates correction is 19.257 *significant at p<0.05

No mortality has been noted in our study among all the 64 liver abscess patients that were included in our study and followed up.

5. Discussion

In our study out of 64 patients, 58 patients (90.62%) were males and 6 patients (9.37%) were females. Male to female ratio was 10.6:1. B.Paik et al⁷(2015)reported male and female ratio 7:1 and other Indian studies like Aradhana Singh et al⁸(2019) and Mukhopadhyay et al⁹(2008) reported male to female ratio 13.3:1 and 11:1 respectively and male to female ratio was 6.6:1 study done by Chaudhary et al¹⁰(2015)

The most common age group affected was between 20 to 40 years and mean of age was 36.21 ± 11.58 , comparable to study done by Chaudhary et al¹⁰(2015) where mean was 41.7 ± 13.9 years of age similiarly in Study done by Aradhana Singh et al⁸(2019) mean was 41.2 ± 14.3 .

Most common symptoms of our study was pain in Right upper quadrant of abdomen present in all patients, which was positively compared with studies done by A.Ramchandra et al¹¹(2018) and by Chaudhary et al¹⁰(2015) they noticed abdominal pain in 88.60 % and 92.1% of patients respectively.

In our study about 60% patients of ALA reveals around or oval lesion with well-defined margins with lack of prominent peripheral echoes. The lesions were primarily hypochoic, with homogenous low density echo and some distal sonic enhancement.

Table 18: Lobe involvement in various study

Location of Abscesses	Present Study	Chaudhary et al ¹⁰	A Ramchandra et al ¹¹	Narwade et al ¹²
Righ Lobe	56 (87.5%)	73.7%	91.40%	94%
Left lobe	4(6.25%)	7%	5.70%	6%
Both lobe	4(6.25%)	19.3%	2.90%	--

In our study 56 cases (87.5%) abscesses were located in right lobe of liver and 4 (6.25%) of abscesses were located in left lobe of liver and remaining 4 (6.25%) abscesses where located in both lobe of liver. According to A Ramchandra et al¹¹ in 90.40% patients had right lobe abscesses and in 6% patients had left lobe abscesses in rest abscesses involved in both lobe. Chaudhary et al¹⁰ reported that 73.7% of abscessed were located in right lobe, and 7% in left lobe and rest 11.5% of abscesses located in both lobe of liver.

Table 19: Solitary /multiple abscess in various study

Location of Abscesses	Present Study	Chaudhary et al ¹⁰	S. Singh et al ¹³
Solitary	84.37%	62.30%	75%
Multiple	15.62%	37.7%	25%

In our study 54 (84.37%) cases of solitary liver abscesses were found and rest 10 cases (15.62%) of multiple liver abscesses were reported. According to S.Singh et al¹³(in 2013)75% of amoebic liver abscesses was solitary.

75% patients of our study had low hemoglobin (Hb< 12gm %) mean was 10.12 ± 1.6 gm% which compared with studies done by A. Ramchandra et al¹¹ they found that 71.4% patients were anemic in their study.

In our study 56.25% of patients had S. Albumin <3gm/dl and mean was 3.05 ± 0.46 gm/dl which was favorably compared with study done by S. Ghosh et al¹⁴ (3.0 ± 0.56). Hypoalbuminemia (90.4%) was found in study of Chaudhary et al¹⁰ also.

The diagnosis of Amoebic liver abscess was confirmed by serology. Indirect hem- agglutination and gel diffusion precipitation were used with high sensitivity and specificity. IgG ELISA of all 64 (100%) patients was positive with high titer.

Culture of Aspirate was sterile, odorless and about 75% patient's shows characteristics anchovy sauce like aspirate. No growth was found on culture.

In our study maximum no. of cases 87.5% abscesses were located in right lobe of similiar to A. Ramchandra et al¹¹ (90.40% right lobe abscesses) and Chaudhary et al¹⁰ (73.7% right lobe abscess).

In our study (84.37%) cases of solitary liver abscesses were found and rest 5 cases (15.62%) of multiple liver abscesses were reported. According to S.Singh et al¹³(in 2013) 75% of amoebic liver abscesses was solitary.

In our study 16 (25%) patients treated with percutaneous drainage under USG guidance and percutaneous aspiration done in 25% of all cases. Surgical treatment comprising of

laparotomy and laparoscopic drainage was done in total of 14 cases (21.87%). According to Ramesh Kumar et al¹⁵ they concluded surgical drainage and antimicrobial therapy was pillar of treatment. According to S. Singh et al¹³ percutaneous catheter drainage was a superior modality as compared to percutaneous needle aspiration specifically in larger abscesses which were partially liquefied or with thick pus.

In our study patients with serum albumin >3gm/dl, 75% uncomplicated cases of ALA and 25% complicated cases of ALA was noticed whereas patients with low serum albumin (<3gm/dl), 25% uncomplicated cases of ALA and 75% complicated cases of ALA were noticed that was found statistically significant $P = 0.000269$ and longer duration of hospital stay was noticed with low serum albumin.

In our study only 8 (12.5%) patients of ALA had normal serum leptin and 56 (87.5%) patients of ALA had low Serum Leptin. Mean \pm 2SD of serum was 1.09 ± 0.81 . According to F. Alam et al¹⁶ (in 2016) they noticed 82(90%) patients of ALA had low serum leptin level has compared to 12% in healthy control.

Duration of hospital stay and complication of amoebic liver abscess patients with normal Serum Leptin was less in comparison to low Serum Leptin level patients. maximum number of complicated amoebic liver abscess was found in Hypoleptinemic patients. According to S. Moore et al¹⁷ (in 2002) they concluded that leptin act as a peripheral signal of energy restriction but do not support an association between immune function and fasting plasma levels in children of this age. According to Priya Duggal et al. (2011)¹⁸ Leptin signaling is significant in mucosal defense against amebiasis.

6. Conclusion

- 1) Amoebic liver abscess is the most common type of liver abscess in our region. It remains to be a significant cause of morbidity and mortality in tropical countries like India.
- 2) Amoebic liver abscess patients with low serum albumin and low serum leptin and with low haemoglobin levels had more complication rate and longer duration of hospital stay.
- 3) More elaborate multicentric studies are required to establish a more direct causal relationship between these
- 4) The study can help us to address the patients of ALA well and manage them properly with respect to low Haemoglobin levels and address anemia and help these patients recover faster

References

- [1] Peters RS, Gitlin N, Libke RD. Amebic liver diseases. *Ann Rev Med* 1982; 32: 161-74.
- [2] World Health Organization (1997), Amoebiasis, WHO Weekly Epidemiology 4th april 1997.
- [3] Ochsner A, de Bakey M, Murray S. Pyogenic abscess of the liver. An analysis of forty-seven cases with review of the literature. *The American Journal of Surgery*.

- 1938; 40(1):292-319.
- [4] Salles JM, Monraes LM, Salles MC. Hepatic Amebiasis *Braz J Infect Dis*. 2003;7:96-110.
- [5] Haque R, Huston CD, Hughes M et al. Current concepts amebiasis *N Engl J Med*. 2003;18:1565-1573.
- [6] Donovan AJ, Yellin, AE, Ralls PW. Hepatic abscess. *World J.surgery*(1991) 15162-169 Pitt HA surgical management of hepatic abscess, *WorldJ.Surgery*(1990)14-498-50
- [7] B Paik, SK Sarkar, PK Chowdhury, S Ahmed. Clinical profile of amoebic liver abscess patients admitted in a tertiary care hospital *Bang Med J Khulna* 2015; 48 : 20
- [8] Singh, A., Banerjee, T., Kumar, R., & Shukla, S. K. (2019). *Prevalence of cases of amebic liver abscess in a tertiary care centre in India: A study on risk factors, associated microflora and strain variation of Entamoebahistolytica*. *PLOS ONE*, 14(4), e0214880. doi:10.1371/journal.pone.0214880
- [9] Madhumita Mukhopadhyay · Anil Kumar Saha · Amitava Sarkar · Swadhin Mukherjee. Amoebic liver abscess: presentation and complications *Indian J Surg* (January–February 2010) 72:37–41
- [10] Das, A., Chowdhury, F., Biswas, M., Prasad, S., Chattopadhyay, S., & Jha, A. (2015). *Clinicopathological study and management of liver abscess in a tertiary care center*. *Journal of Natural Science, Biology and Medicine*, 6(1), 71. doi:10.4103/0976-9668.149091
- [11] Aravind Ramachandra Mirajkar, Kalavathi G. Patients demographics and isposing factors for amoebic liver abscess 2018; Volume :5(34): 2497-2501 2018 DOI :10.18410/jebmh/2018/515
- [12] Nandh Kishore Narwade, Abhijit Bagul, Naseem Khan, Sridevi Murali, Rahul Borude, Aniket Ray, Yashraj Shah. What is the recent trend in the clinical study of liver abscess cases? *International Surgery Journal Narwade N et al. Int Surg J*. 2018 Apr;5(4):1382-1387
- [13] Sukhjeet Singh, Poras Chaudhary, Neeraj Saxena, Sachin Khandelwal, Deva Datta Poddar, Upendra C. Biswal. Treatment of liver abscess: prospective randomized comparison of catheter drainage and needle aspiration. *Annals of Gastroenterology* (2013) 26, 1-8
- [14] Soumik Ghosh, et al Clinical, Laboratory, and Management Profile in Patients of Liver Abscess from Northern India 2014 <http://dx.doi.org/10.1155/2014/142382>.
- [15] Kumar, R., Anand, U., Priyadarshi, R. N., Mohan, S., & Parasar, K. (2019). *Management of amoebic peritonitis due to ruptured amoebic liver abscess: It's time for a paradigm shift*. *JGH Open*. doi:10.1002/jgh3.12144
- [16] Alam F, Salam A, Mahmood I, Kabir M, Chowdhury S, et al. (2016) Amebic Liver Abscess is Associated with Malnutrition and Low Serum Leptin Level. *J Infect Dis Ther* 4:298. doi:10.4172/2332-0877.1000298.
- [17] Moore SE, Morgan G, Collinson AC, Swain JA, O'Connell MA, et al. (2002) Leptin, malnutrition, and immune response in rural Gambian children. *Arch Dis Child* 87: 192-197.
- [18] P. Duggal, X. Guo, R. Haque et al., "A mutation in the leptin receptor is associated with Entamoebahistolytica infection in children," *The Journal of Clinical Investigation*, vol. 121, no. 3, pp. 1191-1198, 2011.