

ORIGINAL ARTICLE

## CLINICAL PROFILE OF LIVER ABSCESS IN CHILDREN

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### ABSTRACT

**Objective:** To determine clinical profile of liver abscess in children.

**Methods:** Twenty-six children with liver abscess that were referred over a period of 4 years were included in this study. Statistical analysis was done using chi-square test.

**Results:** Mean age was  $5.5 \pm 3.3$  years. Fever (96%), pain in abdomen (81%) and hepatomegaly (92%) with tender liver (62%) were the most common presenting clinical features. Leukocytosis (92%), hypoalbuminemia (89%) and anemia (58%) were the most common laboratory features. Pus culture grew organisms only in 11.8%. Most of the abscesses were solitary (69%) with a predilection to right lobe (62%) of liver. Mean size of the abscess was  $6.6 \pm 2.3$  cm. Indirect Hemagglutination test for amoebiasis was positive in 67%. No patient died and drainage of abscess was the most common mode of treatment along with intravenous antibiotics. Multiple abscesses were more commonly found in males as compared to females (odds ratio: 8.75, 95%CI - 0.8840 to 86.6069). Bilateral liver lobe as compared to either lobe involvement was more common in males (Odds ratio = 15.7368, 95% CI= 0.7818 to 316.7496). However, females had right lobe being most involved. (Odds ratio 1.2857, 95% CI- 0.1432 to 11.5437). Tender hepatomegaly was more commonly seen with left lobe abscess. (Odds ratio=2.5, 95% CI 0.2237 to 27.9409).

**Conclusion:** Patients with liver abscess commonly present with fever, abdominal pain and tender hepatomegaly. Males have multiple abscesses more commonly with both lobe involvement while females tend to present with solitary lesions with a predilection to the right lobe.

### Introduction

Liver abscess is a fairly common problem in the developing countries with pyogenic liver abscess constituting majority (80%) of hepatic abscess in children.<sup>1</sup> It constitutes more than 79 per 100,000 pediatric admissions in India while in developed countries it is much less commonly seen (25 per 100,000 pediatric admissions in USA).<sup>1,2</sup> *Staphylococcus aureus* is the most common organism associated with hepatic abscess and these usually presents with fever, abdominal pain and tender hepatomegaly.<sup>3</sup> A solitary abscess may have an insidious onset while multiple abscess presents in an acute fashion.<sup>4</sup> Children have unique set of predisposing factors with skin infections, bile duct ascariasis being more commonly associated.<sup>5,6</sup> However factors associated with multiple and solitary liver abscesses and lobes involved are not known. It has been reported that single abscesses were more likely than multiple abscesses to contain more

than one organism and mortality in patients with single abscesses is 15% and in those with multiple abscesses is 41%.<sup>7</sup> We undertook this study to determine the clinical profile of liver abscess in children and determine factors associated with multiple versus solitary and right versus left lobe affection that may in early diagnosis and timely management in these patients.

### Methods

This retrospective study was done at a tertiary referral center over a period of 4 years from the 2014-2017 after approval from the hospital administration and informed consent from the parents. Records of patients were evaluated and 26 children less than 15 years of age who were diagnosed to have liver abscess on ultrasound examination were studied. A detailed clinical history and biochemical examination were done in all patients. Pus culture was done to determine the causative organism and indirect hemagglutination (IHA) for amoeba, hemogram, liver function tests, HIV Elisa were done in all patients. Patients with hemoglobin <10 gm/dl were labeled as anemic while white cell count more than 12000/cumm were labeled as leukocytosis. Among liver enzymes, SGOT more than 40 IU/L, SGPT more than 25 IU/L were high. Bilirubin >1.2 mg/dl and albumin <3.5 gm/dl were taken as jaundice and

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### KEYWORDS

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hypoalbuminemia respectively. Prothrombin time (PT) more than 2 secs and partial thromboplastin time (PTT) more than 9 secs than control was prolonged.

The data was analyzed and any association between solitary or multiple abscess with the clinical parameters was established along with any predilection to one of the lobes.

Statistical analysis was calculated using chi-square test and Odds ratio.  $P < 0.05$  was considered significant.

### Results

Mean age of presentation was  $5.5 \pm 3.3$  years. Male: female ratio was 11:15. Common clinical features at presentation were fever in 25 (96.2%), pain in abdomen in 21 (80.8%), hepatomegaly in 24 (92.3%), tender liver in 16 (61.5%), vomiting in 10 (40%) and jaundice in 2 (7.7%) patients. On biochemical evaluation, 22 out of 24 recorded (91.7%) showed leukocytosis while 16 out of 18 recorded (88.9%) showed hypoalbuminemia. Anemia was seen in 14 out of 24 (58.3%) patients. On analyzing liver function, 1 out of 18 (5.5%) had increased bilirubin level while 13 out of 24 (54.2%) showed increased SGPT and 12 out of 24 (50%) had raised SGOT levels, increased PT was seen in 11 out of 16 (68.8%) and 4 out of 16 (25%) had increased PTT.

Solitary abscess was seen in 18 (69.2%) while the rest 8 patients (30.8%) had multiple liver abscesses. Right lobe of liver was affected in 16 (61.5%) patients, left lobe of the liver was involved in 4 (15.5%) while 6 patients (23%) had involvement of both lobes. Pus

culture was positive in 2 of them and grew *pseudomonas aeruginosa* and *staphylococcus aureus* each while 8 out of 12 patients (66.7%) recorded had positive IHA. Patients were positive IHA were in addition treated with metronidazole and chloroquine. HIV Elisa was negative in all patients. All patients received intravenous antibiotics while surgical drainage was required in 17 patients (70.8%) of which 85% were from the left lobe. All patients responded to therapy and no patient died. Only two of them developed complications, which were empyema and portal vein thrombosis respectively. Various clinical and biochemical parameters associated with lobe affection of liver are depicted in Table 1. Though not statistically significant, abscess affecting both lobes as compared to either lobe involvement was more common in males (Odds ratio = 15.7368, 95% CI = 0.7818 to 316.7496). However, females had right lobe being most involved. (Odd's ratio - 1.2857, 95% CI - 0.1432 to 11.5437). Tender hepatomegaly was more commonly seen with left lobe abscess. (Odd's ratio = 2.5, 95% CI 0.2237 to 27.9409). Various clinical and biochemical parameters associated with number of abscesses are depicted in Table 2. It was found out that multiple abscesses were more common in males as compared to females. (Odd's ratio: 8.75, 95% CI -0.8840 to 86.6069).

### Discussion

Liver abscess is uncommon in children and is mostly endemic in Thailand, India, Egypt and South Africa.<sup>6</sup> Liver abscess is seen more commonly in

**Table 1.** Various clinical and biochemical parameters associated with lobe of the liver.

Criteria	Right lobe (N = 16) n (%)	Left lobe (N = 4) n (%)	Bilateral (N = 6) n (%)	P value
Fever	16 (100)	4 (100)	5 (83.33)	0.965
Male	7 (43.75)	2 (50)	6 (100)	0.513
Female	9 (56.25)	2 (50)	0	
Age < 5 years	7 (43.75)	1 (25)	3 (50)	0.866
Age ≥ 5 years	9 (56.25)	3 (75)	3 (50)	
Pain in abdomen	12 (75)	3 (75)	6 (100)	0.912
Vomiting	7 (43.75)	2 (50)	1 (16.67)	0.668
Jaundice	1 (6.25)	1 (25)	0	0.417
Hepatomegaly	15 (93.75)	4 (100)	5 (83.33)	0.979
Tender liver	9 (56.25)	3 (75)	3 (50)	0.922
Anemia	7 (43.75)	4 (100)	3 (50)	0.603
Leukocytosis	14 (87.5)	4 (100)	4 (66.67)	0.904
Increased bilirubin	0	1 (25)	0	0.102
Increased SGOT	5 (31.25)	4 (100)	3 (50)	0.395
Increased SGPT	6 (37.5)	3 (75)	4 (66.67)	0.654
Decreased albumin	10 (62.5)	3 (75)	3 (50)	0.925
Prolonged PT	8 (50)	2 (50)	1 (16.67)	0.611
Prolonged PTT	3 (18.75)	1 (25)	0	0.545

**Table 2.** Various clinical and biochemical parameters associated with number of abscesses.

Criteria	Solitary (N = 18) n (%)	Multiple (N = 8) n (%)	P value
Fever	18 (100)	7 (87.5)	0.828
Male	8 (44.44)	7 (87.5)	0.309
Female	10 (55.56)	1 (12.5)	
Age < 5 years	7 (38.89)	4 (50)	0.740
Age ≥ 5 years	10 (55.56)	4 (50)	
Pain in abdomen	13 (72.22)	8 (100)	0.598
Vomiting	8 (44.44)	2 (25)	0.518
Jaundice	1 (5.55)	1 (12.5)	0.575
Hepatomegaly	17 (94.44)	7 (87.5)	0.902
Tender liver	10 (55.56)	5 (62.5)	0.865
Anemia	10 (55.56)	4 (50)	0.885
Leukocytosis	16 (88.89)	6 (75)	0.791
Increased bilirubin	1 (5.55)	0	0.508
Increased SGOT	8 (44.44)	4 (50)	0.874
Increased SGPT	8 (44.44)	5 (62.5)	0.631
Decreased albumin	12 (66.67)	4 (50)	0.688
Prolonged PT	10 (55.56)	1 (12.5)	0.160
Prolonged PTT	4 (22.22)	0	0.195

children with major debilitating disease, granulocyte dysfunction, sickle cell disease and congenital or acquired immunosuppression.<sup>8</sup> The most common pathogen for liver abscess is *S. aureus* followed by amoebic (20-30%) and fungal infection.<sup>1,9</sup> Parasitic infections, genetic factors immune deficiency disorders, skin infection, protein calorie malnutrition and post trauma constitute the risk factors of developing liver abscess in children.<sup>10</sup>

Bacteria and other pathogenic organism can invade the liver through various routes including the biliary tract, portal vein and hepatic artery.<sup>8</sup> Infections near portal beds can result in localized septic thrombophlebitis which may release septic emboli into the portal circulation where they are trapped by hepatic sinusoids and act as a nidus for hepatic abscess formation.<sup>4,5</sup> Another formulated theory is that penetrating hepatic injuries can directly inoculate the organism resulting in pyogenic liver abscess while non penetrating hepatic trauma causes liver abscess by localized hepatic necrosis, intrahepatic hemorrhage and bile leakage which provides a suitable environment for bacterial growth. Sometimes helminthic parasitic eggs and larva act as a nidus for infection.<sup>4,5</sup>

A solitary abscess is insidious in its presentation while multiple abscesses usually have an acute presentation. Liver abscess usually presents with fever, abdominal pain and tender hepatomegaly as seen in most of our patients.<sup>11</sup> In our study, female was affected more commonly with a male: female ratio of 11:15. This contrasts with study done by Ferreira et al, who noted a

higher incidence of male children being infected.<sup>12</sup> This may be due to this being a hospital-based study and our small sample size, population with liver abscess not referred may have been missed.

We found out that right lobe was more commonly affected with majority of them being solitary (15 out of 16 right sided liver abscesses were solitary). This is similar to a study done by Wang et al. This is because the right hepatic lobe receives more volume from the right portal vein which continues the direction of the common portal vein while the left portal vein takes a more horizontal route. Also due to lesser bulk of the left lobe with greater space under the left hemidiaphragm makes it less obtrusive than corresponding lesions in the right.<sup>6,13</sup>

In our study, though statistically insignificant, we found out that in males, both lobes were more commonly involved whereas in females, right lobe was commonly associated. However, no association between gender and lobe involvement has been found in other studies. This finding needs to be evaluated in future studies.

In our study, we also found out that multiple abscesses were more common in males while solitary abscess was more commonly seen in females. However, no such data has been cited in any other study. A higher incidence in males of multiple abscesses in adults has been found to be related to different lifestyle of men and women of our country with menfolk going out to work and consuming unhygienic articles while the women are largely confined to their homes which predispose the males to multiple infectious sources.<sup>14</sup> However in

children, this does not seem to be the cause. Since we had a female predominance in our study, it is possible that the patients with bilateral lobe involvement which were predominantly males may have been referred late to the hospital and thus there may have been a bias towards solitary liver abscess affecting the right lobe. Ultrasonography and CT are widely used as diagnostic tools for liver abscess. In amoebic liver abscess, the yield of trophozoites in amoebic pus is poor; hence, an indirect evidence of infection can be provided by serological test for *E. histolytica* like IHA as was seen in our patients.<sup>15</sup>

Untreated liver abscess is almost always fatal and is usually treated by drainage and antibiotic therapy, which was the mode of treatment given to our patients. Some indicators like jaundice, liver failure, acute abdomen and sepsis, bilirubin levels >3.5 mg/dl, encephalopathy, large volume of abscess, multiple abscesses and hypoalbuminemia (<2 mg/dl) are poor prognostic markers.<sup>16</sup>

In our study, only two developed complications that were associated with right lobed liver abscess. This contrasts with study done by Sharma et al, who showed that left lobe abscess was more frequently associated.<sup>10</sup>

Our study has a limitation as it has small number of patients. Moreover, since this is a hospital-based study, we may have noted a different pattern in the preponderance of the disease.

### Conclusion

Children with liver abscess commonly present with fever, abdominal pain and tender hepatomegaly. Males have multiple abscesses more commonly with both lobe involvement while females tend to present with solitary lesions with a predilection to the right lobe. Further studies may be needed to evaluate the observed trend, as none of the observed associations have been found to be a statistically significant finding.

### Contributor Statement

HD designed the study and did data collection. SS did review of literature. AS did statistical analysis and did review of literature. HD will be guarantor of the paper.

### Compliance with Ethical Standards

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Conflict of Interest: None

### References:

1. Guittet V, Ménager C, Missotte I, Duparc B, Verhaegen F, Duhamel JF. Hepatic abscesses in childhood: retrospective study about 33 cases observed in New-Caledonia between 1985 and 2003. *Arch Pediatr* 2004;11:1046-1053.
2. Kumar A, Srinivasan S, Sharma AK. Pyogenic liver abscess in children-South Indian experiences. *J Pediatr Surg* 1998;33:417-421.
3. Brook I, Fraizer EH. Role of anaerobic bacteria in liver abscesses in children. *Pediatr Infect Dis J* 1993;12:743-747.
4. Barakate MS, Stephen MS, Waugh RC, et al. Pyogenic liver abscess: a review of 10 years' experience in management. *Aust N Z J Surg* 1999;69:205-209.
5. Sharma MP, Kumar A. Liver abscess in children. *Indian J Pediatr* 2006; 73: 813-817
6. Ferreira MA, Pereira FE, Musso C, Dettogni RV. Pyogenic liver abscess in children: some observations in the Espírito Santo State, Brazil. *Arq Gastroenterol* 1997;34:49-54
7. McDonald MI, Corey GR, Gallis HA, Durack DT. Single and multiple pyogenic liver abscesses. Natural history, diagnosis and treatment, with emphasis on percutaneous drainage. *Medicine (Baltimore)*. 1984;63:291-302.
8. Salles JM, Moraes LA, Salles MC. Hepatic amebiasis. *Braz J Infect Dis* 2003; 7: 96-110.
9. Mishra K, Basu S, Roychoudhury S, Kumar P. Liver abscess in children: an overview *World J Pediatr* 2010;6:210-216
10. Hendricks MK, Moore SW, Millar AJ. Epidemiological aspects of liver abscesses in children in the Western Cape Province of South Africa. *J Trop Pediatr* 1997;43: 103-105.
11. Moulds-Merritt C, Frazee RC. Therapeutic approach to hepatic abscesses. *South Med J* 1994;87:884-888.
12. Bari S, Sheikh KA, Malik AA, Wani RA, Naqash SH. Percutaneous aspiration versus open drainage of liver abscess in children. *Pediatr Surg Int* 2007;23:69-74.
13. Wang DS, Chen DS, Wang YZ, Li JS. Bacterial liver abscess in children. *J Singapore Paediatr Soc* 1989;31:75-78.
14. de Kolster CE, Guerreiro N, de Escalona L, Perdomo G, Márquez R, de Laurentin N. Hepatic abscess in children: analysis of 20 cases. *G E N* 1990;44:221-226.
15. Ahmed L, el Rooby A, Kassem MI, Salama ZA, Strickland GT. Ultrasonography in the diagnosis and management of 52 patients with amoebic liver abscess in Cairo. *Rev Infect Dis* 1990;12: 330-337.
16. Sharma MP, Dasarathy S, Verma N, Saksena S, Shukla DK. Prognostic markers in amoebic liver abscess: a prospective study. *Am J Gastroenterol* 1996;91:2584-2588.