

Clinical, Demographic, and Aetiological Profile of Liver Abscess in Children Admitted at a Tertiary Care Hospital - North India

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ABSTRACT

BACKGROUND

Amoebic liver abscess is the commonest extra intestinal site of invasive amoebiasis which mainly affects infants and young children. The incidence of pyogenic liver abscess is much higher among children in developing countries than those in developed countries. Diagnosis of liver abscess can be challenging and is often delayed; a high index of suspicion is necessary in children with risk factors. Children have unique set of predisposing causes for liver abscesses. The purpose of this study was to assess the clinical, demographic, and etiological profile of liver abscess in children between 1 month to 12 years of age.

METHODS

This is a prospective observational study conducted in the Department of Pediatrics, Chacha Nehru Bal Chikistalaya (An Autonomous Institute under Govt. of NCT (National Capital Territory) of Delhi, affiliated to University of Delhi), Delhi from July 2016 to August 2017. All children aged 1 month to 12 years admitted with liver abscess (included consecutively) were enrolled after considering inclusion and exclusion criteria. Written and informed consent was taken from parents/guardians of children aged less than 7 years. Informed assent was taken from children aged more than 7 years, along with written and informed consent from their parents/guardians. Their clinical characteristics, radiological features and laboratory data were analysed.

RESULTS

Most common age group suffering from liver abscess was 5 - 10 years with male preponderance. Majority of the children belonged to lower socio-economic class and half of them were suffering from malnutrition. Most common clinical presentation of children suffering from liver abscess was fever with pain abdomen and tender hepatomegaly. Majority of the children had leucocytosis, high level of C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR). Deranged liver function test with coagulopathy was noted in more than half of the children suffering from liver abscess. Commonest bacterial pathogen was methicillin resistant *Staphylococcus aureus* followed by *Salmonella typhi*, *Stenotrophomonas maltophilia*, coagulase negative *Staphylococcus aureus* and *Staphylococcus hominis*. Entamoeba histolytica is a common parasitic agent causing liver abscess in children.

CONCLUSIONS

Liver abscess should be considered in children presenting with fever and abdominal pain. Most cases involve a single lesion on right lobe of the liver. Methicillin resistant *Staphylococcus aureus* followed by *Salmonella typhi* are the two most common pathogens.

KEYWORDS

Paediatric Liver Abscess, Amoebic Liver Abscess, Pyogenic Liver Abscess, Children

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BACKGROUND

Hepatic abscess was recognised since ancient times but the first detailed study was a ten year period study analysis done by Oschner et al. from 1928 - 1937 published in 1938 included 186 cases of liver abscess showed that the amoebic liver abscess was more common than pyogenic.¹ The incidence of pyogenic liver abscess is much higher among children in developing countries than those in developed countries. In a study done in Pondicherry by Kumar et al. found incidence of liver abscess was 78.9 per 100,000 paediatric admissions.² Kaplan et al. in an epidemiological study done in North America reported the incidence of liver abscess to be 2.3 per 1,00,000 population.³ Pineiro-Carrero et al in a study done reported the incidence of liver abscess was 25 per 1,00,000 children in Texas.⁴ Fererria et al. in a study done in Brazil reported incidence of liver abscess to be one in 138 paediatric admissions.⁵ In a study done by Tsai et al. in Taiwan reported that the incidence of liver abscess is 8.9 per 1,00,000 paediatric admissions.⁶ Kong et al. reported that the incidence of paediatric liver abscess in Taiwan was 20 per 1,00,000 admissions.⁷

The rise in incidence is due to better diagnosis with the use of modern imaging techniques and the increased survival rate of children with immunodeficiency states, who have special predilection towards hepatic amoebiasis is endemic in tropical and sub-tropical region of Asia, Africa and Latin America. Amoebic liver abscess is the commonest extra intestinal site of invasive amoebiasis that mainly affect infants and young children.⁸ It is found in 10 % of the patients who have amoebic infestation of intestinal tract. Amoebic abscesses are the most common type of liver abscesses worldwide.

A retrospective data from Europe collected by Guittet et al. showed similar results as Oschner et al. that amoebic liver abscess is more common compared to pyogenic liver abscess.⁹ Liver abscess is more common in males in both paediatric and adult population. In a study done in Lucknow by Chaubey et al. found the mean age of 5.52 years with male predominance in paediatric patients of liver abscess.¹⁰ Jain et al. in his study he found that the mean age of children affected with liver abscess was 8.2 (range 4 – 14) years and male to female ratio was 4 : 1.¹¹ A retrospective study done in Philippines general hospital in 45 cases of liver abscess found that males are most affected than females with a mean age of 6.35 years.¹²

In a retrospective study done in France in children found that males were predominantly affected with mean age of 7.2 years.¹³ However, in a retrospective study done in Taiwan by reviewing hospital records of 16 years period of liver abscess patients by Hsu et al. showed increased incidence of abscess in female compared to males which is different from other studies.¹⁴ There are several ways of developing pyogenic liver abscess, including bacterial entry into the liver via the biliary tract, portal vein, or hepatic artery.¹⁵ The abscess cavities are variable in size and, when multiple, may coalesce to give a honeycomb appearance. Amoebiasis is most common in subtropical climates, especially in areas with poor sanitation.

Predisposing Factors

Diagnosis of liver abscess can be challenging and is often delayed. A high index of suspicion is necessary in children with risk factors. Children have unique set of predisposing causes for liver abscesses. Parasitic infestations are thought to predispose to pyogenic liver abscesses in children. Almost all parasites including ascariasis, schistosomiasis, fascioliasis, *Trichuris trichura*, *Necator*, *Ancylostoma* and *Toxocara* infestation have been reported as associated worm infestation. These apart, liver granulomas around parasites, their larvae and eggs are believed to trap bacteria in the granulomatous reaction around them serving as nidus. Tissues from liver biopsies or surgical and autopsy specimens in patients with liver abscesses have documented eggs, larvae, and antigens of parasites.^{2,16} Sometimes tropical myositis may point towards a *Toxocara* infestation. Appropriate tests are therefore recommended to ascertain such infestation and follow up treatment should be done.⁷ Skin infections are common in children. These provide a source of bacteraemia and inoculation of infection in liver. Significant co-relations have been documented between pyogenic liver abscesses and skin infections in some large series of children with liver abscesses.⁵ Predominant organism are *Staphylococcus aureus*. *Chromobacterium violaceum* sepsis in tropics and subtropics can present as skin and liver infection. In developing countries, liver abscess in children generally has an association with low socioeconomic status, unhygienic living conditions and malnutrition.¹⁷ However, a prospective study conducted by Ramachandran et al. in 2010 showed that most of the patients were from upper socio economic background suggesting that paediatric hepatic abscesses can occur in children even with mild degrees of malnutrition and from any socioeconomic background.¹⁸ Kumar et al. found that protein energy malnutrition was the associated factor in 27 % followed by measles.² Biliary disease, recent abdominal surgery were found to be most frequent predisposing condition in patient with MRSA liver abscess.¹⁹ There is paucity of data regarding clinical profile, etiological profile and antibiotic sensitivity pattern of paediatric liver abscess in India. Hence, we studied the clinical, demographic, aetiological and laboratory profile of paediatric liver abscess in our institute.

Objectives

To study the clinical, demographic, and aetiological profile of liver abscess in children between 1 month to 12 years of age.

METHODS

This prospective observational study conducted in the Department of Paediatrics, Chacha Nehru BalChikistalaya (An Autonomous Institute under Govt. of NCT (National Capital Territory) of Delhi, affiliated to University of Delhi), Delhi from July 2016 to August 2017. This study has got

Institutional Ethics Committee approval (Regd No: IEC/MAMC/78, Dt: 26/07/2016).

Inclusion Criteria

All patients aged 1 month to 12 years with clinical suspicion of liver abscess having following symptoms such as fever, pain abdomen, vomiting and confirmed liver abscess by ultrasonography.

Exclusion Criteria

Patients who already underwent aspiration or drainage of the abscess earlier and patients with past history of liver abscess

Written and informed consent was taken from parents/guardians of children aged less than 7 years. Informed assent was taken from children aged more than 7 years, along with written and informed consent from their parents/guardians. All the patients were admitted, and initial stabilisation was done as per institutional protocol. Consent was taken for inclusion in study. Separate consent was taken for any intervention whenever required. Further evaluation was done by detailed history, clinical examination and laboratory investigations.

RESULTS

Total of 70 cases between 1 month to 12 years of age with liver abscess were enrolled for the study. All 70 cases were divided into 4 groups according to age group 1 month to 2 years, 2.1 - 5 years, 5.1 - 10 years, 10.1 - 12 years. Liver abscess was found to be more common in age group of 5.1 - 10 years (Table-1). In our study, out of 70 patients, 42 (60 %) were males and females were 28 (40 %) (Table-1). According to Modified Kuppuswamy scale, 37 (52.9 %) out of 70 patients belong to upper lower socio-economic class, while 32 (45.7 %) belonged to lower middle class, 1 (1.4 %) patient belong to lower class (Table-1). In our study, out of 70 patients, we found 18 (25.7 %) were mildly malnourished, 11 (15.7 %) were moderately malnourished, 4 (5.7%) were severely malnourished as per World Health Organization (WHO) definition of malnutrition. Remaining patients were having normal nutritional status (Table-1).

In our study, fever was the most common symptom in 70 (100 %) cases, while pain abdomen was present in 60 (85 %), vomiting was present in 29 (41.4 %), abdominal distension was present in 14 (20 %), cough was present in 10 (14.3), breathing difficulty was present in 8 (11.4 %), jaundice in 3 (4.3 %) (Table-1). While on clinical examination, abdominal distension was present in 18 patients (25.7 %), hepatomegaly was present in 46 (65.7 %) patients, right hypochondrial tenderness was present in 33 (52.9 %), decreased breath sounds were present in 4 (5.7 %) patients (Table-1). Out of 46 (65.7 %) patients with hepatomegaly, 27 patients had associated tenderness

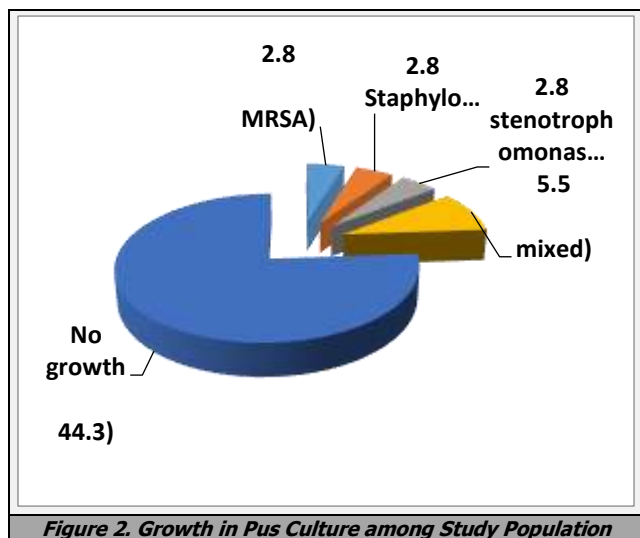
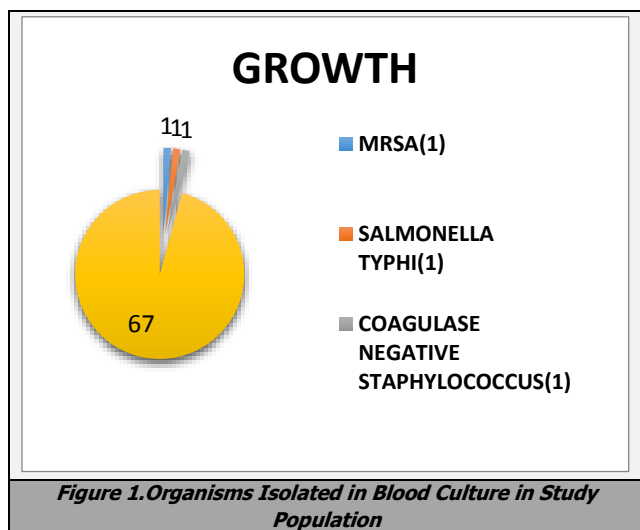
in right hypochondrium. Out of 70 cases, 50 were found to be anaemic. Out of these patients, 5.7 % were severely anaemic, 65.7 % were moderately anaemic and 28.6 % children were suffering from mild anaemia (Table-2). Leucocytosis was present in 91.5 % of our patients (Table-2). CRP (C-Reactive protein) was elevated in 98 % of our patients (Table-2). ESR was elevated in 47 % patients (Table-2). Out of 70 cases with liver abscess, 54 patients were found to have deranged liver function tests. Raised serum total bilirubin was found in 12.9 %(9), serum glutamic oxaloacetic transaminase (SGOT) and serum glutamic pyruvic transaminase (SGPT) were raised in 27.1 % (19), alkaline phosphatase (ALP) was raised in 64.3 %, hypoalbuminemia was present in 77.1 %, gamma glutamyl transferase (GGT) was raised in 51.5 % (36). Derranged coagulation profile was found in 58.5 % (41) patients in the present study (Table-2). In our study, out of 70 patients, 3.2 % patients showed growth in the blood culture. Organisms isolated were Methicillin resistant *Staphylococcus aureus* 1.4 % (1), *Salmonella typhi* 1.4 % (1), *Staphylococcus coagulase* negative 1.4 % (1)(Table-2). Out of 70 patients of liver abscess enrolled in the study, 36 patients underwent aspiration of pus from the abscess.

Clinical and Demographic Characteristics		Frequency (number)	Percentage % (N = 70)
Gender	Male	42	60
	Female	28	40
	Total	70	100
Age groups	1 month - 2 years (< 2 years)	7	10
	2 - < 5 years	15	21.4
	5 - <10 years	41	58.6
	10 - 12 years	7	10
	TOTAL	70	100
Socio-economic status (Modified Kuppuswamy scale)	Upper lower	37	52.9
	Lower middle	32	45.7
	Lower	1	1.4
	Total	70	100
Nutritional status	Mild malnutrition	18	25.7
	Moderate malnutrition-	11	15.7
	Severe malnutrition	4	5.7
	Normal	37	52.9
	Total	70	100
Clinical symptoms	Fever	70	100
	Pain abdomen	60	85
	Vomiting	29	41.4
	Abdominal distension	14	20
	Jaundice	3	4.3
	Cough	10	14.3
	Breathing difficulty	8	11.4
	Hepatomegaly	46	65.7
Clinical signs	Tenderness in right hypochondrium	33	47.1
	Abdominal distension	18	25.7
	Decreased breath sounds	4	5.7

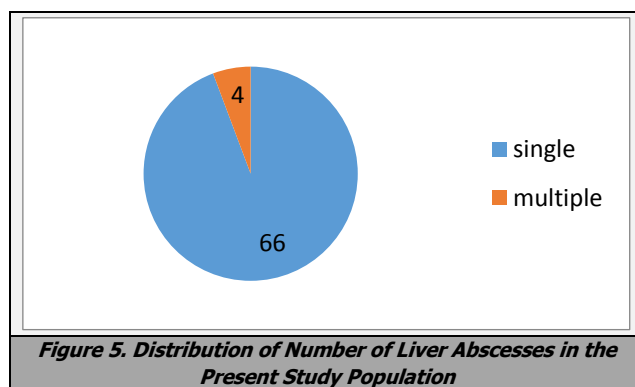
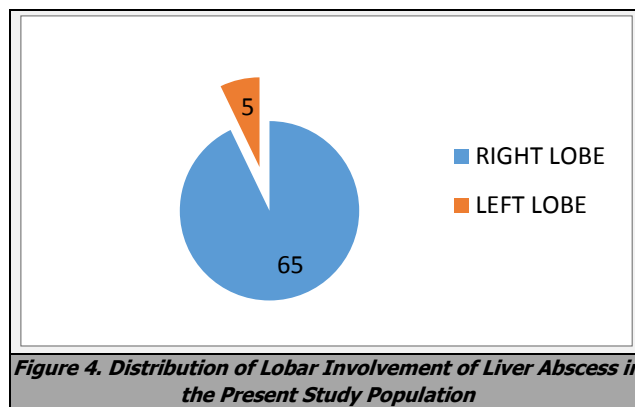
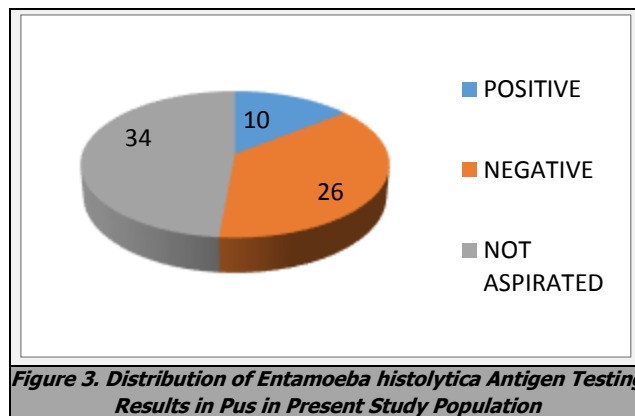
Table 1. Distribution of Clinical and Demographic Characteristics of the Present Study Population

The aspirated pus was sent for microscopy, grams staining, pus culture (Bacterial, fungal and *Mycobacterium tuberculosis*) and *Entamoeba histolytica* antigen. Direct microscopy was done for identification of *Entamoeba histolytica* trophozoite and trophozoite was identified in none of the patients. Out of 36 aspirated cases, gram positive cocci was identified in 1 (1.4 %) patient as shown in table 13.36 aspirated pus samples were stained with ziehl nelsen stain. No acid fast bacilli was identified in all

the patients. Pus culture positivity was found to be 3.2 % and 2.9 % patients showed mixed growth. Organisms grown were methicillin resistant *Staphylococcus aureus* (1), *Staphylococcus hominis* (1), *Stenotrophomonas maltophilia* (1) (Figure-1). All the 36 pus samples were cultures on sabroud dextrose agar for the growth of fungus. No fungal culture showed growth of organism. All the 36 pus samples were cultured in mycobacteria growth indicator tube (MGIT) for *Mycobacterium tuberculosis*. None of the cultures showed growth of *Mycobacterium tuberculosis*. Out of 36 cases aspirated, 10 cases (27.7 %) were found to be positive for *Entamoeba histolytica* antigen in pus (Figure-3). MRSA was the common isolate in both pus culture and blood culture in the present study.



Out of 70 cases of liver abscess, 10 were found to be amoebic liver abscess. Out of 10 cases, ova and cysts of *Entamoeba histolytica* were identified in 5 cases. In our study out of 70 cases, right lobe of liver was involved in 65 (92.9 %) cases, left lobe was involved in 5 (7.1 %) cases (Figure-4). In our study, out of 70 cases, single abscess was found in 66 (94.3 %) and multiple abscess were present in 4 cases (5.7 %) (Figure-5).



Laboratory Parameters (Haematology)	Frequency (number)	Percentage % (N = 70)
Haemoglobin (Gm %)	> 10	20 (28.6)
	5 - 10	46 (65.7)
	< 5	4 (5.7)
Total	70	100
Total leukocyte count()	< 11000	6 (8.6)
	11000 - 20000	34 (48.6)
	> 20000	30 (42.9)
Total	70	100
Liver function tests	Total bilirubin	9 (12.9)
	SGOT	19 (27.1)
	SGPT	19 (27.1)
	ALP	45 (64.3)
	Albumin	54 (77.1)
	GGT	36 (51.4)
	INR	41 (58.5)
C - reactive protein (CRP)	Normal	1 (1.4)
	Increased	69 (98.6)
	Total	70
Erythrocyte sedimentation rate (ESR)	Normal	37 (52.9)
	Increased	33 (47.1)
	Total	70

Table 2. Distribution of Laboratory Parameters (Haematology) among the Present Study Population

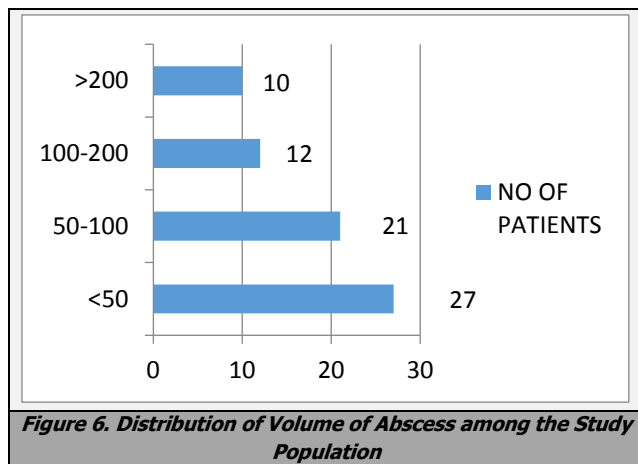


Figure 6. Distribution of Volume of Abscess among the Study Population

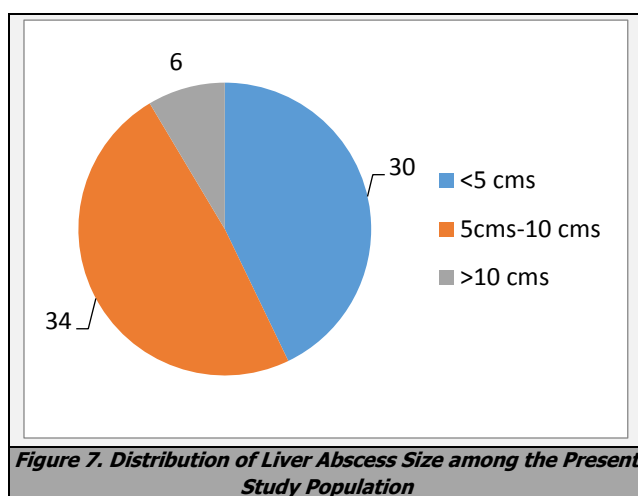


Figure 7. Distribution of Liver Abscess Size among the Present Study Population

Out of 70 cases of liver abscess, 27 (38.6 %) cases had volume of less than 50 ml, 21 (30 %) had volume of 50 ml – 100 ml, 12 (17.1 %) cases had volume of 100 ml - 200 ml and 10 (14.3 %) cases had volume of more than 200 ml (Figure-6). Size of abscess was noted by ultrasound. Out of 70 cases, 30 (42.8 %) were found to be less than 5 cms, 34 (48.6 %) cases were found to be of 5cms to 10 cms, 6 (8.6 %) cases were found to be of more than 10 cms (Figure -7). In the present study, out of 70 cases enrolled, liquefaction of the abscess was observed in 43 (61.4 %) and remaining 27 (38.6 %) were non-liquefied as shown in table 21.

DISCUSSION

In the present study, maximum number of children belonged to 5 - 10 years of age (58.6 %). Other age group were 2 - 5 years (21.4 %) followed by 1 month to 2 years (10 %) and more than 10 years (10 %). Similar findings were noted in a study done by Chaubey et al. in Lucknow with mean age of patients was 5.52 years (range: 1 month - 12 years).¹⁰ Carballo et al. also found the median age of the children suffering from liver abscess was 5 years (range: 9 days - 17 years).²⁰ However Hsu et al. in a study done in Taiwan found 86.7 % of children in a study group were older than 10 years of age.¹⁴ In a study done at Pondicherry by Kumar et al. found that the age ranged

between 3 months to 12 years, with a median age of 3 years.²

In our study, commonest age group suffering from liver abscess were school going children. This is probably due to they being more exposed to environmental risk factors leading to infectious diseases. We found male predominance (60 %) among the children suffering from liver abscess. Similar finding was noted by Ba et al. in a study done in France with male sex ratio was 1.36 : 1 for boys.¹³Chaubey et al. also found male to female ratio of 1.4 : 1.¹⁰ However in a study done in Taiwan, it was found that female predominance was 60 %.¹⁴ Male predominance may be a coincidence and no other specific reasons were found. In our study, we found that most of the children belonged to upper lower followed by lower middle socio-economic class. Similar finding was noted by Chaubey et al. in a study where majority of children belonged to lower socio-economic status.¹⁰ Shamsuzzaman SM et al. found 94.9 % of children were from low socio-economic class.¹⁷ Ramachandran et al. in his study found most of the children of liver abscess represents upper middle socioeconomic status (62.2 %). Majority of children (75.4 %) came from an urban background.¹⁸

This suggests that infective diseases are more common in poor socio-economic status people due to poor hygiene and poor nutritional status. We found 47.1 % of children with liver abscess were suffering from malnutrition. Among these children, mild malnutrition was present in 25.7 %, moderate malnutrition in 15.7 % and severe malnutrition in 5.7 %. Kumar et al. found 27 % of children were suffering from moderate to severe malnutrition.² Guittet et al. in a study done in New Caledonia France found 39 % of the children affected were malnourished.⁹ Most of the children in our study suffering from liver abscess were well nourished. This suggests that although malnutrition contributes for the occurrence of infective diseases in children due to poor immune status, liver abscess can occur in any patients irrespective of their nutritional status. In our study, all patients had fever (100 %) followed by pain abdomen (85 %). Other symptoms were vomiting (41.4 %), abdominal distension (20 %), cough (14.3 %), breathing difficulty (11.4 %), and jaundice (4.3 %). Hepatomegaly was present in 65.7 %, tenderness in right hypochondrium in 47.1 %, abdominal distension in 25.7 %. Choudhury et al. in their study found fever and pain abdomen (100 and 81 %), abdominal distension (23.37 %) and features of generalized peritonitis (9.09 %) as common symptoms.²¹ Chaubey et al. found most common symptom in patients with liver abscess was fever (78 %) followed by pain abdomen.¹⁰ Yacaria et al. found most common symptoms were pain abdomen followed fever. Other symptoms were cough, malaise, weight loss, fatigue and vomiting.²² Symptoms of liver abscess are mainly due to inflammatory process which leads to fever with chills and tender hepatomegaly. Distension of hepatic capsule contributes to the pain abdomen. Irritation of diaphragm and in some cases due to reactionary pleural effusion patients suffer from cough and breathing difficulty. Hepatocellular dysfunction due to abscess may lead to jaundice. Rupture or spread of inflammation to the

peritoneum lead to peritonitis in some patients. However, in our study symptoms of peritonitis and sub-acute intestinal obstruction were not observed. In our study, 71.4 % of patients were found to be anaemic. Most of the children (91.4 %) were having leukocytosis. All of them had high C-reactive protein level. High ESR level was found in 47 % of children. Muroah et al. in their study found leukocytosis in 93 % of patients and elevated C-RP level in all patients.¹⁵ Yacaria et al. found leukocytosis in 74 % and anaemia in 72 % patients.²² Anaemia may be due to pre-existing malnourished status of the patient. However, the cause of anaemia was unknown in well-nourished patients of liver abscess in our study. Leukocytosis, high level of CRP, high ESR level are known markers of bacterial infection in human. In our study, 54 patients with liver abscess had deranged liver function tests. Total 77.1 % of patients had hypoalbuminemia and 64.3 % of patients had high level of ALP, coagulopathy with deranged international normalized ratio (INR) and prothrombin time (58.5 %). Other parameters deranged were GGT (51.4 %), SGOT (27.1 %), SGPT (27.1 %), S. Bilirubin (12.9 %). Similar finding was noted with Choudhury et al. where he found 78 % of patients had deranged coagulation profile.²¹ Dekolester et al. also found abnormal prothrombin time in 80 – 90 % of patients.²³ Shrivastava et al. also found deranged prothrombin time in his study.²⁴ Lok et al. in their study found, hypoalbuminemia in 92.8 % followed by leukocytosis in 74.8 % patients, increased ALP in 72.1 % patients, and elevated SGPT in 58.6 % patients, hyperbilirubinaemia was found in 44.1 % patients.²⁵ Derangement of liver function test occurs due to inflammation induced hepatocellular injury leading to defective synthetic function resulting to deranged coagulation profile. Organisms isolated from liver abscess patients vary widely. Out of 70 patients in our study, aspiration of the abscess was done in 36 patients and pus culture positivity was 8 % (3). Blood culture was done in all patients of liver abscess and positivity was 4 % (3). The most common etiological agent was Methicillin resistant *Staphylococcus aureus* (MRSA) which was isolated from both pus (2.8 %) and blood culture (1.4 %). Other etiological agents isolated were *Salmonella typhi* (1.4 % in blood culture), *Stenotrophomonas maltophilia* (2.8 % in pus culture), *Staphylococcus hominis* (2.8 % in pus culture), coagulase negative staphylococci (1.4 % blood culture). Salahi et al. in his study found that *Staphylococcus aureus* (62 %) was the most common organism causing liver abscess.²⁶ Ferreria et al. also found that the *Staphylococcus aureus* was the most common isolate from pus of the patients with liver abscess.⁵ Few other studies done in children shows different results with the growth of *Escherichia coli* and *Klebsiella* in aspirated pus samples.^{14,22} All the 36 pus samples were subjected to Entamoeba antigen detection tests and total 10 samples were positive for Entamoeba histolytica antigen (27 %). Haque et al. in a study done in Virginia found that out of 27 liver abscess pus specimens, 11 (41 %) were positive for lectin antigen.²⁷ In our study, *Entamoeba histolytica* was detected by antigen tests. Anaerobic cultures were not performed due to non-availability of kit in our institution. It

can be noted that parasitic etiological agent is a causative agent of liver abscess in paediatric group beside bacteriological agent. *Stenotrophomonas maltophilia* was a rare organism that was isolated in 1 of our patient. According to evidence available, it is considered that a positive blood culture growth for *Stenotrophomonas* is usually due to colonisation in indwelling catheter. But in our case this organism was grown in pus culture which is significant. In our study, the low level of positivity in blood culture and pus culture could partly be due to prior antibiotic therapy before admission. In our study, it has been noted that Entamoeba histolytica antigen was detected in highest number of cases (27 %) but growth of Entamoeba histolytica and demonstration of trophozoites in pus is gold standard in diagnosis of amoebic liver abscess. But in our study, none of the pus samples showed trophozoites in microscopy and anaerobic culture was not done due to non-availability of facilities in our institution. So it can be stated that Entamoeba histolytica is a parasitic agent in causation of liver abscess but not the commonest organism. In our study, highest number of abscesses located in the right lobe (92.9 %) followed by left lobe (7.1 %) as described in the earlier studies. Muroh et al. in a study observed that the right lobe of the liver was affected in 15 patients, with additional involvement of the left lobe in 4 patients.¹⁵ Similar finding was noted by Shrivastava et al. where right lobe was involved in 20 out of 26 patients, left lobe in 3 and both the lobes were involved in 3 patients.²⁴ Carballo et al. found that right lobe was most commonly involved.²⁰ This is due to the streaming of blood flow to the right lobe of the liver and most of the volume of the liver is formed by the right lobe of the liver. In our study, ultrasonographically, we confirmed size, volume, liquefaction status of the liver abscess to decide the management plan as per the protocol (flow chart mentioned in methodology). In our study, size of 5 cms - 10 cms abscess were found in highest number of patients (48.6 %) followed by abscess of size less than 5 cms in 42.8 %, abscess of size more than 10 cms in 8.6 % of patients. While observing the volume of the abscess, we found highest number of patients (38.6 %) had abscess of volume less than 50 ml followed by abscess of 50 ml – 100 ml volume in 30 %, abscess of 100 - 200 ml volume in 17.1 %, and abscess of > 200 ml volume in 14.3 %. In our study, most of the patients (61.4 %) had abscess with liquefaction.

CONCLUSIONS

The demographics and clinical features of liver abscess may differ among regions. A high index of suspicion is necessary in children with risk factors. Liver abscess should be considered in children presenting with fever and abdominal pain. Pyogenic liver abscess should be considered in children presenting with fever, abdominal pain, and leukocytosis with a high CRP level. Most cases involve a single lesion on right lobe of the liver. Methicillin resistant *Staphylococcus aureus* followed by *Salmonella typhi* are the two most common pathogens. In our study,

anaerobic culture for pus and blood could not be done due to lack of facilities. Due to this, growth of *Entamoeba histolytica* and other anaerobic organisms could not be isolated. However, in our study we found high positivity of entamoeba antigen in pus.

Data sharing statement provided by the authors is available with the full text of this article at jebmh.com.

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