

Study of clinico-aetiological profile and management of liver abscess in a tertiary care centre

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Abstract

Background: Liver abscess if diagnosed late or left untreated, the disease leads to fatal course with significant morbidity and mortality.

Methods: We prospectively studied the clinical presentations, aetiological factors, microbiological aetiology, management and outcome in 30 patients with liver abscess seen over a period of 6 months at our tertiary care hospital.

Results: Their mean age was 50.1 (range 18 to 84) years; there were 24 (80%) males. The common symptoms were fever (80%), abdominal pain (20%) and vomiting and jaundice (10%). The common laboratory abnormalities were increased alkaline phosphatase (80%), leucocytosis (65%), hyper-bilirubinaemia (45%) and hypoalbuminaemia (70%). Abdominal ultrasonography was diagnostic in 90% of cases. Fifteen (50%) patients had positive microbial culture reports. The most common organism identified was *Escherichia coli* (40%) followed by *Entamoeba* (15%); *Pseudomonas* (10%); *Klebsiella* and *Enterococcus* (5%) and *Mycobacterium tuberculosis* in one patient. Percutaneous needle aspiration and drainage were employed as the primary therapy in 24 patients. Biliary disease accounted for 18 cases and 6 were considered to be idiopathic. Four patients (13%) died.

Conclusions: Liver abscess is a diagnostically challenging problem due to nonspecific presenting characteristics. Our observations emphasise the importance of percutaneous drainage as a mainstay of therapy.

Keywords: Entamoeba, *Escherichia coli*, liver abscess, *Mycobacterium tuberculosis*, percutaneous drainage

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Submitted: 17-Jun-2021 Accepted: 11-Jul-2021 Published: 01-Feb-2022

INTRODUCTION

Liver abscesses are broadly classified into pyogenic and amoebic based on the aetiology. Amoebic infection accounts for two-thirds of cases in developing countries, whereas pyogenic liver abscess constitutes three-fourth of cases in developed nations.^[1] Although amoebiasis

is the predominant cause of liver abscess in tropical countries, pyogenic and tuberculosis aetiologies should always be considered in differentials. The aetiology of hepatic abscesses has changed tremendously over the past few decades. The increasing incidence of cholelithiasis and biliary tract pathology, with their tendency to cause

Access this article online	
Quick Response Code:	Website: www.jcsr.co.in
	DOI: 10.4103/jcsr.jcsr_36_21

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How to cite this article: Kiranmayee N, Subbalaxmi MVS, Umabala P, Kapoor A. Study of clinico-aetiological profile and management of liver abscess in a tertiary care centre. *J Clin Sci Res* 2022;11:7-12.

ascending portal sepsis, has replaced appendicitis as the leading aetiology of liver abscess.^[2-4]

Recent advances in diagnostic and interventional radiology led to improved management strategies such as minimally invasive percutaneous drainage with reduced duration of hospital stay compared to conservative treatment and favourable outcomes.^[5] In addition to the antimicrobial therapy, percutaneous drainage of abscess has become a mainstay of treatment. However, few patients do not respond to percutaneous drainage and deteriorate. It is important to promptly identify such patients for whom open surgical intervention is the definitive treatment. The objective of the present study is to assess the changing trends in clinical patterns, etiological factors, microbiological aetiology and management in patients with liver abscess in a tertiary care hospital.

MATERIAL AND METHODS

During June 2019 to December 2019, we prospectively studied 30 patients with liver abscess seen at our tertiary care teaching hospital in Hyderabad, Telangana. The study was approved by the Institutional Ethics Committee, and informed consent was obtained from all the patients. In all patients, a detailed history was taken and clinical examination was carried out. At presentation haemogram, liver function test, serological testing for viral markers, chest X-ray, blood and pus cultures, ultrasonography (USG) and computed tomography (CT) of abdomen (wherever necessary). Their clinical profile, a etiological and microbial factors, management and outcome were assessed.

Statistical analysis

Data was recorded on a predesigned proforma and managed using Microsoft Excel (Microsoft Corp, Redmond, USA). All the entries were double-checked for any possible error. Descriptive statistics were reported as mean ± standard deviation, median (IQR), as appropriate. Categorical variables were reported as percentages. The statistical software IBM SPSS Statistics Version 22 (IBM Corp Somers NY, USA) was used for statistical analysis.

RESULTS

Their mean age was 50.1 (range 18 to 84) years; there were 24 (80%) males (male-to-female ratio 4:1). Most of the patients were in the age group of 41–50 years (*n* = 10). Out of 30 patients, 25 were alcoholic (83.3%). Diabetes mellitus (DM) was evident in 5 patients. Other risk factors includes human immunodeficiency virus (HIV) infection,

chronic hepatitis B, cirrhosis of liver and prior abdominal surgery.

Fever was the most common presenting feature (90%) followed by pain abdomen (76%) (Figure 1). Other symptoms observed include yellowish discoloration of eyes, breathlessness, nausea, vomiting, diarrhoea and reduced appetite. Most common signs included tenderness in the right hypochondrium (75%) followed by hepatomegaly (50%). On palpation, abdomen was rigid, guarding elicited in 4 patients. Eleven patients were anaemic on examination. Icterus was noticed in 12 cases, and decreased breath sounds in the basal areas of the right lung were observed in 10% of patients (Figure 2).

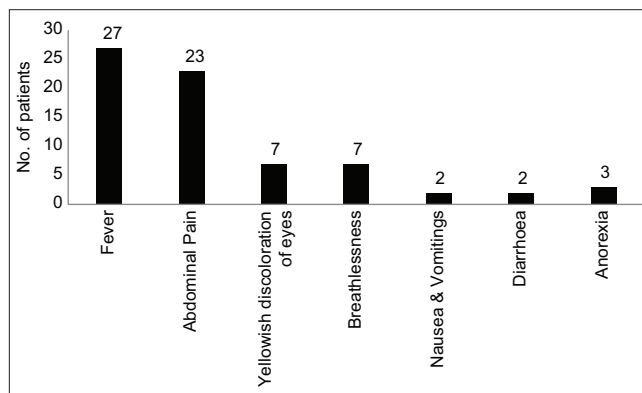


Figure 1: Symptomatology of patients with liver abscess

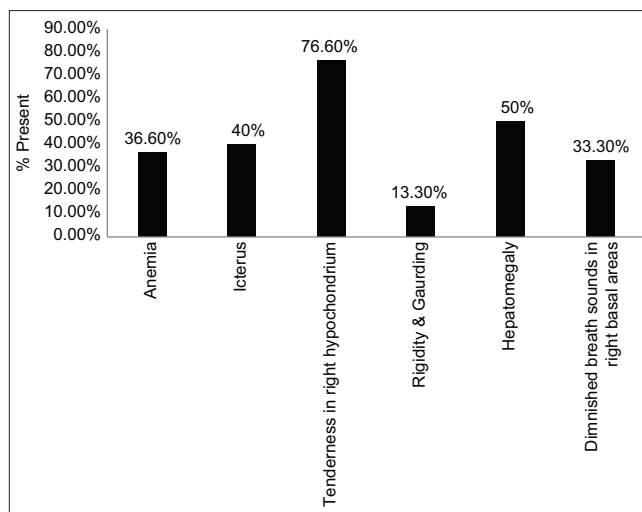


Figure 2: Distribution of signs on physical examination

Laboratory investigations revealed leucocytosis (*n* = 23; 76.6%). Liver function tests were deranged in 27 (90%) cases, the most commonly observed abnormality being elevated serum alkaline phosphatase (ALP), aspartate aminotransferase in 27 and 22 patients, respectively (Table 1).

Table 1: Laboratory profile of patients with liver abscess (n=30)

Investigation	Cut-off value	No. (%)
Haemoglobin	<11 g/dL	11 (36.6)
Total leucocyte count	>11,000 cells/mm ³	23 (76.6)
Total bilirubin	>1.2 mg/dL	14 (46.6)
SGOT	>40 IU/L	22 (73.3)
SGPT	>40 IU/L	20 (66.6)
Alkaline phosphatase	>150 IU/L	27 (90)
Albumin	<3.5 g/dL	21 (70)
INR	>1.5	5 (16.6)
Creatinine	>1.2 mg/dL	11 (36.6)

SGOT=Serum glutamate oxaloacetate transaminase; SGPT=Serum glutamate pyruvate transaminase; INR=International normalized ratio

On abdominal ultrasonography, right lobe was predominantly involved in 15 patients followed by involvement of both lobes in eight patients (Table 2). Multiple liver abscesses as hypoechoic lesions with irregular borders were identified in 19 patients. Contrast-enhanced computerised tomogram (CECT) abdomen showed hypodense lesion with irregular margins and internal septations, and peripheral contrast enhancement suggestive of liver abscess (Figure 3).

Table 2: Lobe-wise distribution of liver abscess based on abdominal ultrasonographic findings (n=30)

Observations	No. (%)
Lobe involved	
Right	15 (50)
Left	7 (23.3)
Both	8 (26.6)
Number of abscesses	
Solitary	11 (36.6)
Multiple	19 (63.3)

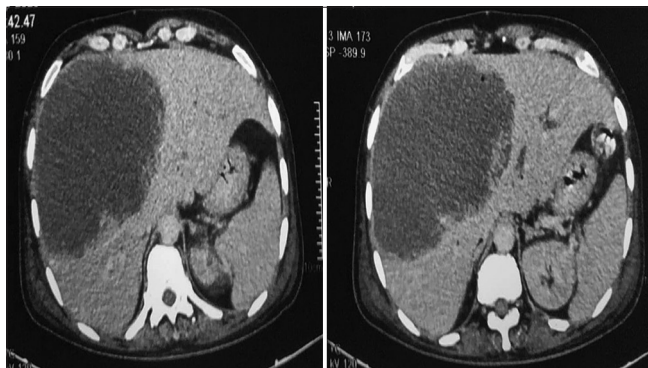


Figure 3: Axial sections of CECT abdomen of a patient showing solitary liver abscess involving right lobe

On abdominal ultrasonography gall stones and portal pyaemia were seen in 7 (23.3%) patients each. Haematogenous spread was observed in 5 (16.6%) patients. In 11 (36.6%) patients, no aetiological was identified for liver abscess.

Ultrasonography-guided percutaneous aspiration of pus was performed from cavities larger than 5 cm size and no clinical response to antibiotics even after 48 h. Aspirate was sent for Gram's stain, cultures, acid-fast bacilli (AFB), fungal stain and cultures wherever suspected. Pus cultures were positive in 17 (56.6%) patients. Organisms isolated were *Escherichia coli* (n = 10 cases), *Burkholderia cepacia* (n = 3), *Klebsiella* (n = 2), *Enterococcus faecalis* (n = 1) and *Mycobacterium tuberculosis* (n = 1) (Table 3).

Table 3: Microbiological investigations in 30 patients with liver abscess

Variable	No. (%)
Anchovy sauce appearance	9 (30)
Serology positive for anti-amoebic antibodies	7 (23.3)
Positive pus culture	17 (56.6)
Organism isolated	
<i>E. coli</i>	10 (33.3)
<i>Klebsiella</i>	2 (6)
<i>B. cepacia</i>	3 (9)
<i>E. faecalis</i>	1 (3.3)
<i>M. tuberculosis</i>	1 (3.3)
Positive blood culture	5 (16.6)
<i>E. coli</i>	3 (13.3)
<i>Pseudomonas</i>	1 (3.3)

Blood cultures were positive in five cases (16.6%), with *E. coli* and *Pseudomonas* being the most common microbes isolated (Table 3). On gross examination of the aspirate, anchovy sauce appearance was noted in nine cases (30%). Serology for anti-amoebic antibodies was positive in 23.3% of cases. Out of 30 cases, amoebic aetiology constituted 10 (33.3%) patients and pyogenic liver abscess accounted for the remaining 20 (66.6%) cases.

All patients were started on empirical parenteral broad-spectrum antibiotics and switched to higher antibiotics after susceptibility reports. Ultrasonography-guided percutaneous needle aspiration was performed in five cases, and pig tail catheter was left *in situ* for drainage of pus in 19 cases (Table 4).

Table 4: Management and outcome in 30 patients with liver abscess

Variable	No. (%)
Medical management alone	5 (16.6)
Antibiotics + USG-guided percutaneous needle aspiration	5 (16.6)
Antibiotics + USG-guided catheter drainage	19 (63.3)
Outcome	
Dead	4 (13.3)
Alive	24 (86.6)

USG=Ultrasonography

Complications observed during hospital course include sepsis (33.3%), rupture of abscess (16.6%), empyema (7%) and portal vein thrombosis (3.3%). Four patients (13.3%) had mortality during treatment in our study (Figure 4).

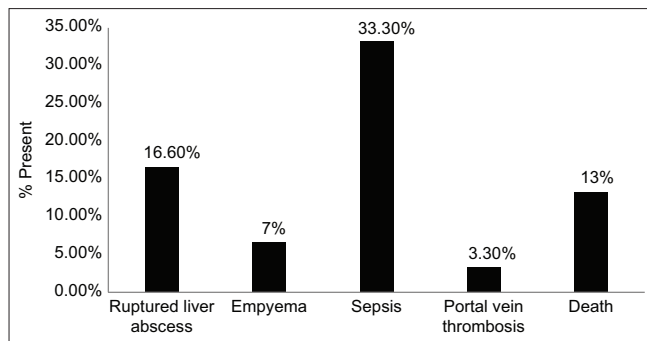


Figure 4: Complications observed in patients with liver abscess

DISCUSSION

The liver functions as the initial site of filtration of absorbed intestinal luminal contents and is in constant contact with various microbial antigens. Liver abscess is the formation of pus-filled cavity in the liver parenchyma due to bacterial, fungal or parasitic infection. Etiologically, it is mainly classified into two groups, namely amoebic and pyogenic. The microbes find their way to liver from biliary tract (due to biliary calculi, stricture and neoplasm); infectious gastrointestinal disorders spreading via portal vein (colitis, appendicitis and diverticulitis); haematogenous seeding via hepatic artery; direct invasion from nearby source (sub-diaphragmatic or sub-hepatic abscess) and penetrating trauma.

Liver abscess is common infectious condition in tropics such as India. It is caused by *Entamoeba histolytica* (amoebic), bacteria (pyogenic), *M. tuberculosis* and fungi. Among them, amoebic liver abscess has been predominantly been reported from developing nations and has been reported to commonly affect young males, especially alcoholics. The present study has shown that 24 out of 30 patients were males (80%) and 25 patients were alcoholic (83.3%). In a study^[6] 61.1% of patients with liver abscess were alcoholic. The male preponderance noted in our study was consistent with observations reported in other studies.^[7,8]

Most of the patients were in the age group of 41–50 years with mean age of 50.1 years. Similar observations were reported in other studies^[6,9,10] where the mean age of the patients was reported to be 43.6 years,^[6] 49 ± 11 years^[9] and 40.5 years^[10] respectively.

High alcohol consumption by males increases susceptibility to amoebic liver abscess. Alcohol impairs the ability of Kupffer cells to clear amoeba in the liver. Diet rich in iron content as obtained from country liquor and carbohydrate-rich diet predisposes to invasive amoebiasis.^[11] Diabetes mellitus is associated with 3.5-fold

increased risk of liver abscess due to impaired leucocyte adherence, chemotaxis, phagocytosis and antioxidant systems, resulting in reduced bactericidal activity.^[7] In our study, DM was present in 5 patients.

Approximately two-thirds of cases of liver abscess in developing countries are of amoebic aetiology, and three-fourths of cases in developed countries are pyogenic.^[1] On the contrary, most of the cases ($n = 20$; 66.6%) are pyogenic origin in our study. In general, pyogenic liver abscess is associated with predisposing biliary tract or colonic disease such as acute cholecystitis, choledocholithiasis, biliary enteric bypass procedures, chronic pancreatitis, diverticulitis, colonic perforation, appendiceal abscess, perforated appendicitis, malignant obstruction of the common bile duct, cholangiocarcinoma, pancreatic carcinoma and carcinoma of the colon.^[3]

However, pyogenic liver abscess in which no specific predisposing factor could be identified despite detailed search is increasingly being reported.^[3,12] Similarly, no cause was found in 36.6% of cases in our study. Gall stones were noted in 23.3% of cases, portal pyaemia was evident in 23.3% of cases and haematogenous spread was reported in 10% of cases in our study.

Majority of the patients presented with fever (90%) and abdominal pain (76%) (Figure 1). This is consistent with report from another study^[13] in which pain abdomen (99%) and fever (94%) were the common symptoms reported. Abdominal tenderness in the right hypochondrium is the most common sign observed followed by hepatomegaly in 50% of patients (Figure 2). Diminished breath sounds in the basal areas of the right lung with evidence of right pleural effusion were noticed in 33.3% of our patients. Right-sided pleural effusion was reported in 30% of cases in a study.^[13] The pleural effusion was reactive collection as they spontaneously resolved after treating the abscess.

Jaundice was noticed in seven of our patients (23.3%). A study^[13] reported 26% of patients with jaundice. In the earlier studies,^[12-14] it was reported in 26%–50% of cases with liver abscess.^[14] Recently, jaundice has become less common due to the advent of good antimicrobial therapy. In a study^[10] it was found in only 12.7% of cases.

In our study, 23 patients (76.6%) had leucocytosis and 27 patients (90%) had elevated serum ALP levels. Abdominal ultrasonography is still the investigation of choice for diagnosing liver abscess, with sensitivity ranging from 92% - 97%.^[15] Right lobe is the most common lobe

involved in liver abscess, due to streaming effect in portal circulation.^[6,13] Right lobe of the liver receives most of the blood draining from right colon, which is the primary site of intestinal amoebiasis. Colonic diseases predisposing to pyogenic liver abscess are also common in this lobe. In addition, blood flow is more and biliary canaliculi are denser in the right lobe, leading to more congestion.^[13]

In accordance with previous studies,^[16,17] right lobe was commonly involved in 15 of our patients followed by both the lobes in eight patients (Table 2). In a study^[16] site of abscess was predominantly in the right lobe of liver (72%). Right lobe predominance was also in another study.^[17]

Blood cultures were positive in five (16.6%) cases (Table 3); *E. coli* was isolated in three cases and *Pseudomonas aeruginosa* in one patient. Anchovy sauce appearance of purulent material was noticed in nine (30%) patients, and amoebic serology was positive in seven (23.3%) patients. Aerobic cultures from liver abscess were positive in 17 (56.6%) cases. Microbial culture of pus detected *E. coli* in ten patients, *B. cepacia* in three patients, *Klebsiella* in two cases and *E. faecalis* and *M. tuberculosis* in one patient each.

In a study^[16] pus cultures yielded growth in seven (64%) cases while blood cultures were positive in two cases. They identified Gram-positive cocci as the most common organism isolated from pus. In contrast to our study, Gram-negative pathogens were detected in 3 (27%) cases.

In a study^[13] Gram-negative organisms were frequently identified etiologically, with *E. coli* being the most common pathogen seen in 17 cases followed by *Klebsiella* in 11 cases, *Pseudomonas* (4 cases), *Acinetobacter* and *Staphylococcus* in four patients each, *Enterococcus* in three and *Citrobacter* in one patient. Blood cultures were positive in three patients only. The results were in accordance with our study with Gram-negative bacteria being the predominant organism isolated. AFB were positive in pus in 15 cases, and *Candida* was isolated from cultures in three cases. 71% of patients had shown anchovy sauce appearance of pus when drained from abscess, with amoebic serology being positive in 73% cases.

In a study^[9] *Klebsiella pneumoniae* ($n = 5$), *E. coli* ($n = 2$), *Entamoeba histolytica* in 1 case and amoebic serology was positive in one patient were reported out of 11 patients studied. In a study^[18] of 50 patients with liver abscess, abscess pus culture yielded *E. coli* in 19 patients (38%), 7 (14%) showed *Klebsiella* and 11 patients (22%) showed polymicrobial growth. Pus cultures were not conclusive in rest of the cases.

All patients were initiated on parenteral antibiotics empirically such as third-generation cephalosporins or piperacillin-tazobactam and metronidazole and changed to appropriate antibiotics as per the susceptibility results. In patients with no evidence of clinical improvement even after starting 48 h of starting medications and in those with abscess of larger size (>5 cm), ultrasonography guided percutaneous needle aspiration and catheter drainage were done in 16.6% and 63.3% of cases, respectively (Table 4). Catheter was left *in situ* for an average duration of 8 days and removed after the drain amount was minimal or decrease in abscess size on repeat imaging with improvement in clinical condition. No surgical intervention was done in our study.

It was shown that catheter drainage was more effective than needle aspiration, especially for abscesses greater than 5 cm size. When compared to catheter drainage, needle aspiration was associated with significantly longer time to achieve 50% reduction in size of abscess cavity and failure rates were also higher.^[19] Similar observations were reported in another^[16] in which all patients were given similar empirical antibiotics and changed according to the sensitivity tests. Ultrasonography-guided percutaneous drainage of liver abscess was done in all patients within 24 h of presentation. Catheter drainage was performed in 91% of patients for duration ranging from 4 to 7 days. Two patients (18%) underwent surgical intervention in the form of right hemihepatectomy in view of clinical deterioration despite catheter drainage.

In a study^[13] minimally invasive drainage techniques, such as, percutaneous needle aspiration were done in 79% of patients in addition to antimicrobials. Surgical intervention was done in 4% of patients due to rupture of abscess and progressive deterioration.

Complications occurred in our study population during hospitalisation were sepsis in 10 cases, rupture of abscess in five cases, empyema into right pleural cavity in two cases and portal vein thrombosis in one patient (Figure 4). Intercostal chest drain was placed in patients who developed empyema. Four patients (13.3%) died of sepsis during hospitalisation (Table 4).

In other studies, overall mortality was 2%-15%. 5%.^[10,13] No mortality was reported in another study^[16] and all patients made complete recovery and abscess resolution after 1 year.

Liver abscess is clinically challenging to diagnose due to nonspecific presenting features. Patients presenting with right upper quadrant pain and fever with tender hepatomegaly should raise a clinical suspicion of liver

abscess. If left untreated or delayed, the disease leads to fatal course with significant morbidity and mortality. The epidemiology, treatment and mortality rate for liver abscesses have changed remarkably from the initial case descriptions. The reduction in mortality may be due to improved imaging and diagnostic techniques, as well as to increased use of percutaneous drainage.

Abdominal ultrasonography is useful not only in diagnosis and intervention but also in the follow-up of the condition and to assess resolution. CECT helped in precise localisation of an abscess, assessment of its relationship to adjacent structures and detection of complications such as rupture, thrombosis of adjacent hepatic and portal veins and communication with pleural space-causing empyema, which is associated with increased mortality.

Timely usage of percutaneous needle aspiration and catheter drainage under ultrasonography guidance is helpful and cost-effective for multiple or solitary abscesses along with systemic antibiotics and metronidazole. It is minimally invasive and readily acceptable to most of the patients and easy to perform and without any complications. Patients treated by this technique recover faster and duration of hospital stay is less. In conclusion, this study emphasises the important role of percutaneous drainage as a mainstay of therapy in this potentially grave disease.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

- 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;40:292-319.
- Huang CJ, Pitt HA, Lipsett PA, Osterman FA Jr., Lillemoie KD, Cameron JL, *et al.* Pyogenic hepatic abscess. Changing trends over 42 years. *Ann Surg* 1996;223:600-7.
- Branum GD, Tyson GS, Branum MA, Meyers WC. Hepatic abscess. Changes in etiology, diagnosis, and management. *Ann Surg* 1990;212:655-62.
- Rahimian J, Wilson T, Oram V, Holzman RS. Pyogenic liver abscess: Recent trends in etiology and mortality. *Clin Infect Dis* 2004;39:1654-9.
- Yu SC, Ho SS, Lau WY, Yeung DT, Yuen EH, Lee PS, *et al.* Treatment of pyogenic liver abscess: Prospective randomized comparison of catheter drainage and needle aspiration. *Hepatology* 2004;39:932-8.
- Mukhopadhyay M, Saha AK, Sarkar A, Mukherjee S. Amoebic liver abscess: Presentation and complications. *Indian J Surg* 2010;72:37-41.
- Lin YT, Wang FD, Wu PF, Fung CP. *Klebsiella pneumoniae* liver abscess in diabetic patients: Association of glycemic control with the clinical characteristics. *BMC Infect Dis* 2013;13:56.
- Wang JH, Liu YC, Lee SS, Yen MY, Chen YS, Wang JH, *et al.* Primary liver abscess due to *Klebsiella pneumoniae* in Taiwan. *Clin Infect Dis* 1998;26:1434-8.
- Dédjan AH, Sel A, Chadli A. Liver abscess in diabetic patients: A case series. *Remed Open Access* 2016;1:1011.
- Sharma N, Sharma A, Varma S, Lal A, Singh V. Amoebic liver abscess in the medical emergency of a North Indian hospital. *BMC Res Notes* 2010;3:21.
- 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;42:644-9.
- Huston CD. Intestinal protozoa. In: Feldman M, Friedman LS, Brandt LJ, editors. *Sleisenger Fordtran's Gastrointestinal and Liver Disease – Pathophysiology, Diagnosis and Management*. 8th ed. Philadelphia, USA: Saunders Elsevier; 2006. p. 2414-9.
- 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;2014:142382.
- Aikat BK, Bhusnurmath SR, Pal AK, Chhuttani PN, Datta DV. Amoebic liver abscess – A clinicopathological study. *Indian J Med Res* 1978;67:381-91.
- Maltz G, Knauer CM. Amoebic liver abscess: A 15-year experience. *Am J Gastroenterol* 1991;86:704-10.
- 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;4:80.
- Bhatia M, Ali M. Ruptured liver abscess: Analysis of 50 cases. *Med J Dr DY Patil Univ* 2017;10:532.
- Sharma MP, Dasarathy S, Sushma S, Verma N. Variants of amoebic liver abscess. *Arch Med Res* 1997;28:5272-3. Rajak CL, Gupta S, Jain S, Chawla Y, Gulati M, Suri S. Percutaneous treatment of liver abscesses: Needle aspiration versus catheter drainage. *Am J Roentgenol* 1998;170:1035-9.
- Zerem E, Hadzic A. Sonographically guided percutaneous catheter drainage versus needle aspiration in the management of pyogenic liver abscess. *AJR Am J Roentgenol* 2007;189:W138-42.