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Research Article

**CLINICOPATHOLOGICAL STUDY AND MANAGEMENT OF
LIVER ABSCESS IN A TERTIARY CARE HOSPITAL****Sampath Kumar. Ch, Sai Krishna. M, Prashanth. N, Narendra Boggula,
Rani Samyuktha Velamakanni***

School of Pharmacy, Anurag Group of Institutions, Venkatapur, Ghatkesar, Telangana, India.

Abstract:

Liver abscess is an uncommon but potentially life threatening disease with significant morbidity and mortality. It is more frequent in the tropical regions like Indian subcontinent due to poor sanitary condition and overcrowding. The common etiological agents for LA are E. histolytica (amoebic), bacterial (pyogenic). Out of them Amoebic liver abscess is largely a disease of developing countries like India. There are many risk factors predisposing patients to liver abscess range from diabetes mellitus, cirrhosis and general immune-compromised state, use of proton pump inhibitor medications, gender and age. The aim of the study is to describe the clinical profile, microbial etiology and treatment approaches for the management of liver abscess. This is a prospective observational study conducted at Gandhi hospital, Secunderabad, Telangana, for a period of 6 months; about 60 patients who meet the study criteria were included in the study. The required data was collected from the patient proforma. 60 patients diagnosed with liver abscess were studied over a period of 6 months. There were 83% of patients are males (n = 50) and 17% were females (n = 10). Male to female ratio was 5:1. The age ranges from 10-90 years, mean age being 49.55 years. Majority of the patients are affected from the age group 51-60 years (26.66%) and 61-70 years (25%). Etiology of abscess was 76.70% amoebic and 23.30 % pyogenic. All the amoebic abscesses are solitary and majority of pyogenic are multiple (78.57%). The abscesses were predominantly in right lobe (70%). Most cases of amoebic etiology are reported from the age group 41-50 years (23.91%), where as pyogenic are reported from age group 61-70 years. The treatment of choice for PLA is a multi modal approach combining broad spectrum antibiotics and aspiration or drainage of abscess cavities. Amoebic liver abscess can be cured by metronidazole therapy without drainage. The key to successful outcome with both the approaches is early diagnosis and institution of appropriate therapy.

Key words: Liver abscess, tertiary care hospital, management, etiology.**Corresponding author:****Dr. V. Rani Samyuktha,**

Assistant Professor,

Department of Pharmacy Practice,

School of Pharmacy, Anurag Group of Institutions,

Venkatapur, Ghatkesar, Telangana, INDIA-500088.

E-Mail: samyukthabhardwaj@yahoo.com

Mob: +91 95504 61677

QR code



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INTRODUCTION:

Liver abscess is an uncommon but potentially life threatening disease with significant morbidity and mortality. Liver abscess has been described as far back as in ancient Greece in 400 B.C., when Hippocrates thought that prognosis of liver abscess was related to the type of fluid in the lesion[1]. A liver abscess may occur as a single abscess or multiple lesions varying in size from a few millimeters to several centimeters in larger abscess[2]. There are many risk factors predisposing patients to liver abscess range from DM, cirrhosis, general immune-compromised state, use of PPI medications, gender and age. Other conditions may compromise the immune system and render it inadequate to counteract pathogens. These include various immunodeficiencies, chemotherapy, solid malignancies, immunosuppression therapy after organ transplant, as well as splenectomy, all of which have been associated with an increased risk of liver abscess[3].

The development of new radiologic techniques, the improvement in microbiologic identification, and the advancement of drainage techniques, as well as improved supportive care, have reduced mortality to 5-30%; yet, the prevalence of liver abscess has remained relatively unchanged. Untreated, this infection remains uniformly fatal[4]. However, recent evidences from percutaneous drainage procedure have shown a favourable outcome with less average length of stay in hospital compared to conservative mode of treatment [5].

Aim

To describe the clinical profile, microbiological etiologies and treatment approaches for the management of patients with amoebic and pyogenic liver abscess.

Objectives

- To estimate the prevalence of amoebic liver abscess.
- To estimate the prevalence of pyogenic liver abscess.
- To evaluate various co-morbidities in patients with liver abscess.
- To assess various risk factors for the developmental liver abscess.
- To assess various complications associated with liver abscess.
- To evaluate various laboratory parameters associated with liver abscess.
- To evaluate various treatment approaches for the management of liver abscess.
- To determine prescription patterns of antibiotics in patient with liver abscess.

METHODOLOGY:**Study Protocol**

It is a prospective observational study conducted for a period of 6 months. Patients who meet the study criteria will be included in the study. The required data will be collected from the patient proforma.

Study Site

The study was conducted at Gandhi Hospital, Secunderabad, Telangana, India.

Study Design

It is a prospective observational study.

Study Period

Study period is about 6 months (August to March).

Study Population

Total number of 60 patients was included in the study.

Study Criteria**Inclusion criteria**

- Patients both male and female, above age 14 years are included.
- Patients diagnosed with amoebic and pyogenic liver abscess.
- Patients who meet the study criteria.

Exclusion criteria

- Pregnant and lactating women are excluded.
- Patients with insufficient data.

Patient enrolment

Patients were enrolled in the study based on inclusion and exclusion criteria.

Study materials

A well structured patient data collection proforma. It was prepared by using various literature reviews and it was used to collect the data of the study population.

Study procedure

A prospective observational study was conducted at Gandhi Hospital, Secunderabad for a period of six months. Based on inclusion and exclusion criteria, amoebic and pyogenic liver abscess patients were included in the study. All necessary and baseline information was collected using the patient data collection proforma. This includes

- Patient demographic characteristics such as age, gender, personal history and habits
- Present illness
- Past medical history
- Past surgical history
- Laboratory data
- Complications associated with liver abscess

- Present medication chart

The collected and documented data was analyzed by using the appropriate statistics based on following parameters:

- Patient distribution based on age.
- Patient distribution based on gender
- Patient distribution based on Body Mass Index.
- Patient distribution based on etiology of liver abscess.
- Patient distribution based on clinical features of the disease.
- Patient distribution based on diagnosis of liver abscess.

- Patient distribution based on significance between various risk factors and disease.
- Patient distribution based on complications associated with liver abscess.
- Patient distribution based on treatment approaches for the management of liver abscess.

Statistical analysis

The percentage method was used to analyze the patient distribution based on various parameters. Softwares like SPSS and MS EXCEL were used to arrange and evaluate the outcomes.

RESULTS:

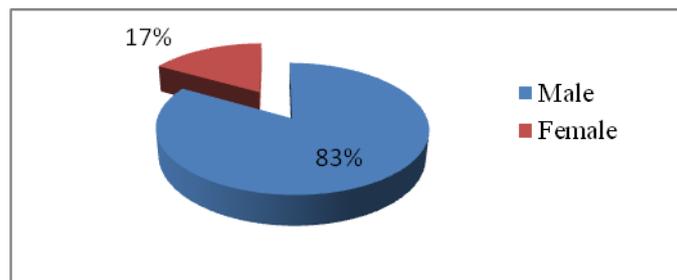


Figure 1: Gender distribution

The graph depicts that from the total population of 60 patients, 83% patients are males and 17% patients are females.

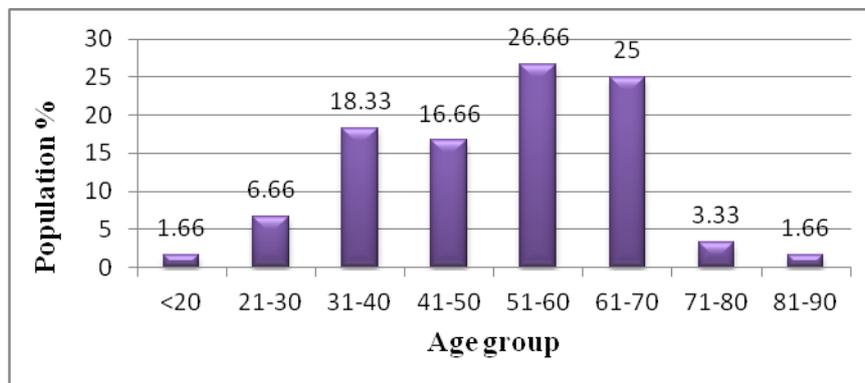


Figure 2: Incidence of liver abscess in different age groups

The graph shows the incidence of liver abscess in different age group patients. Frequency of patients is high in age group 51-60 i.e. 26.6% (16 patients).

Table 1: Abscess number in different age groups of patients

Age in years	Single Liver Abscess (n=49)	Multiple Liver Abscess (n=11)
<20	1	0
21-30	3	1
31-40	9	2
41-50	8	2
51-60	13	3
61-70	12	3
71-80	2	0
>81	1	0

The above Table 1 illustrates the number of abscess in patients with different age groups depending on single or multiple abscesses. The number of patients with single abscess is high in age group 51-60 i.e. 13 and maximum patients with multiple abscess falls under age groups 51-60 and 61-70.

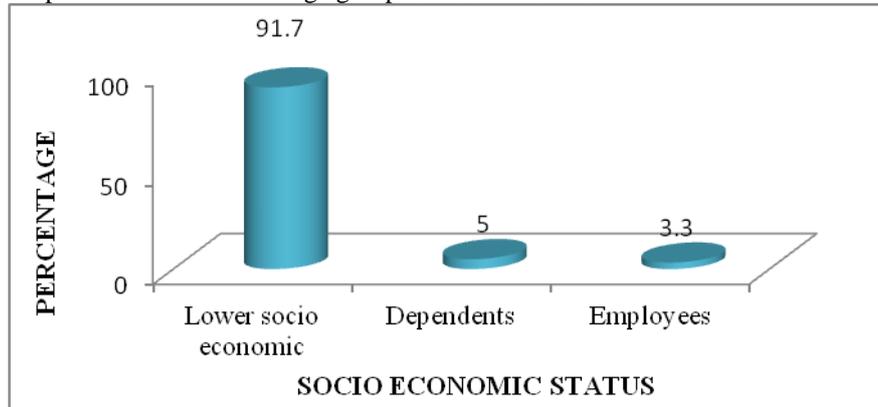


Figure 3: Prevalence of liver abscess based on socio economic status

The above graph shows the distribution of patients based on their socio economic status. There were 91.7% of patients reported from lower socio economic status, 5% of patients were dependents and 3.3% of patients are employees.

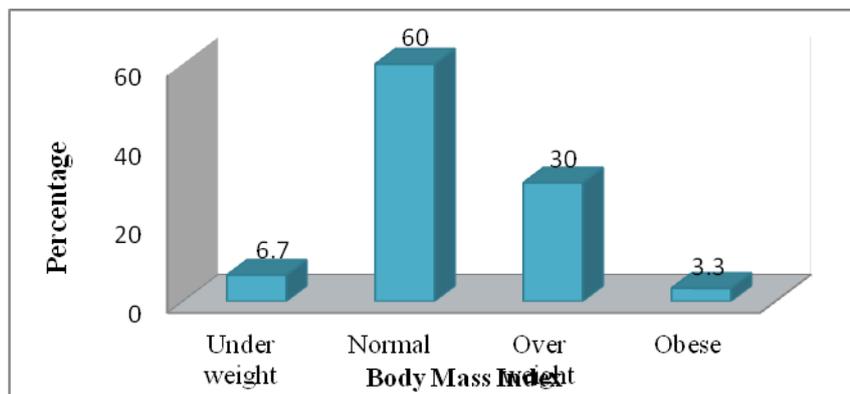


Figure 4: Distribution of population according to Body Mass Index

Above graph depicts the distribution of patients depending on the body mass index (BMI). According to above data, 6.7% (4 patients) are under weight, 60% (36 patients) are normal, 30% (18 patients) were overweight, and 3.3% (2 patients) are obese.

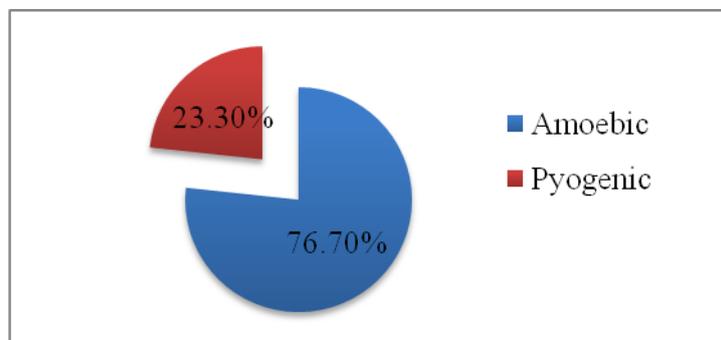


Figure 5: Distribution based on microbial etiology of liver abscess patients

The above figure shows the prevalence of amoebic and pyogenic liver abscess. 76.70% of patients are of amoebic etiology and remaining 23.3% patients are of pyogenic etiology.

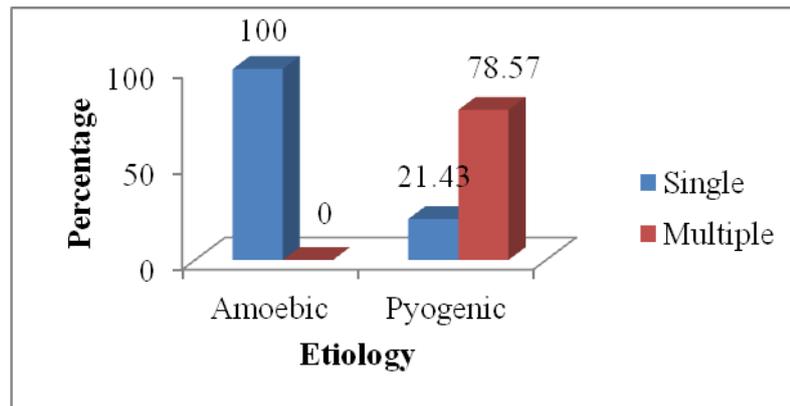


Figure 6: Distribution of patients based on number of abscess

The above graph demonstrates prevalence of single and multiple abscesses in both amoebic and pyogenic liver abscess. 76.3% of patients of amoebic etiology have single abscess and there were no patients have multiple abscess, 5% of patients of pyogenic etiology have single abscess and 18.3% of patients have multiple abscess.

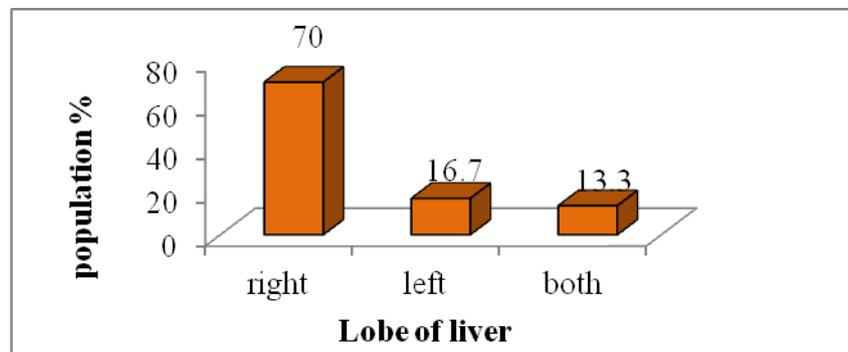


Figure 7: Distribution of patients based on location of abscess

The above graph implies that 70% of total population have abscess in the right lobe of the liver, 16.7% of the patients have abscess in the left lobe of the liver, and 13.3% people have abscess in both lobes of the liver

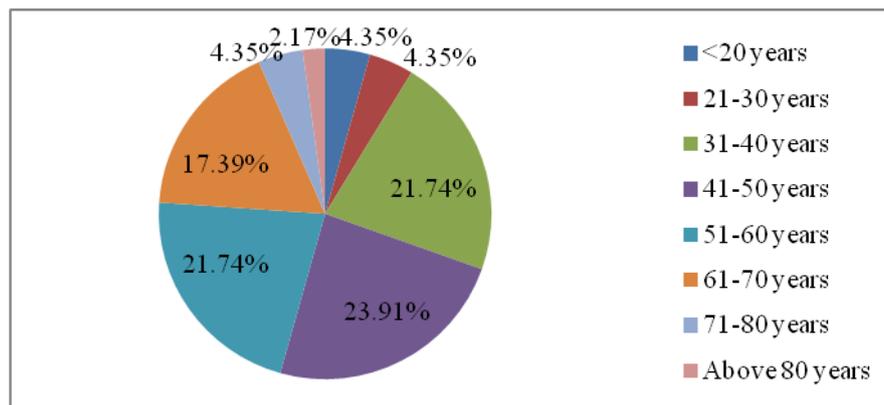


Figure 8: Distribution according to age groups of patients with amoebic liver abscess

Figure 1, 10 shows the percentage of patients affected with amoebic liver abscess according to different age groups. Majority of the patients are reported from the age group 41-50 years (23.91%).

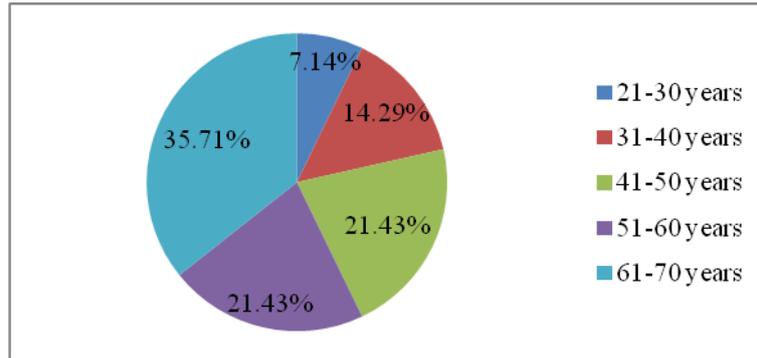


Figure 9: Distribution according to age groups of patients with pyogenic liver abscess

Figure 1, 11 shows the distribution of patients affected with pyogenic liver abscess according to different age groups. Majority of the patients are reported from the age group 51-60 years (21.43%).

Table 2: Chi square test for male gender and liver abscess

	Pearson's chi square		
	value	DF	Significance
Male gender	3.652	1	O.O1

The above table explains the significance of male gender in liver abscess.

Table 3: Chi square test for age greater than 50 years and liver abscess

	Pearson's chi square		
	value	DF	Significance
Age > 50 years	4.582	1	O.O3

The above table explains the significance of age greater than 50 years in liver abscess.

Table 4: Chi square test for type 2 diabetes mellitus and liver abscess

	Pearson's chi square		
	Value	DF	Significance
DMT2	3.373	1	O.O56

The above table explains the significance of type 2 diabetes mellitus on liver abscess.

Table 5: Chi square test for hypertension and liver abscess

	Pearson's chi square		
	value	DF	Significance
HTN	0.298	1	O.585

The above table explains the significance of hypertension on liver abscess.

Table 6: Chi square test for alcohol consumption and liver abscess

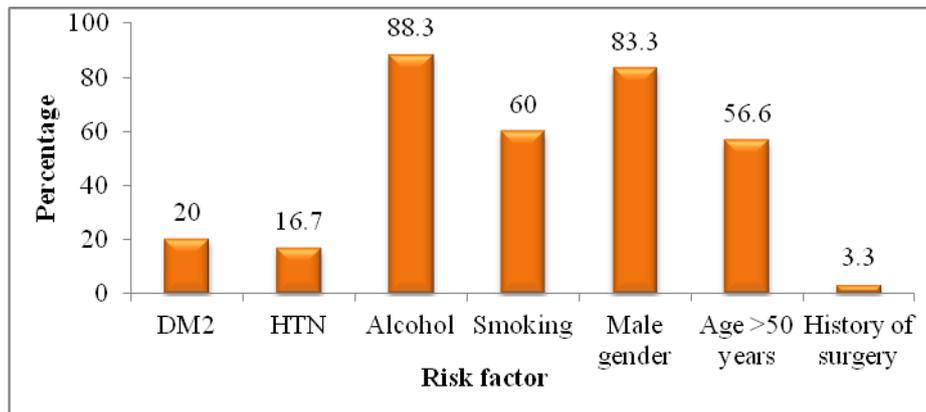
	Pearson's chi square		
	Value	DF	Significance
Alcohol	2.412	1	O.O1

The above table explains the significance of alcohol consumption on liver abscess.

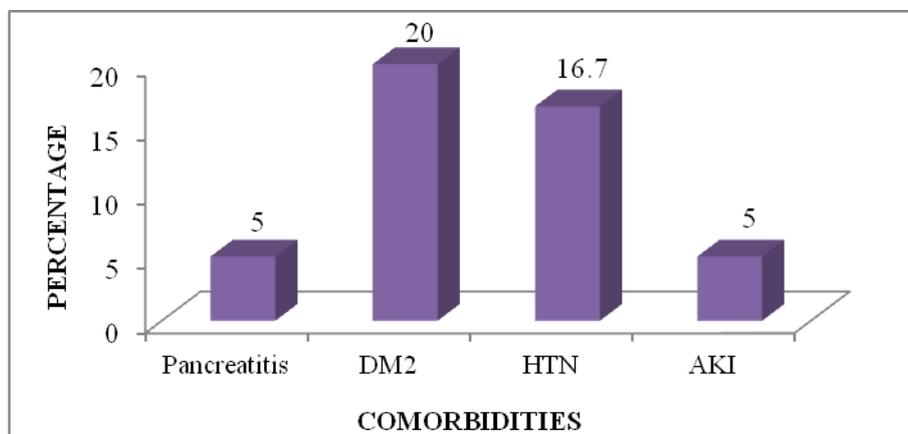
Table 7: Chi square test for smoking and liver abscess

	Pearson's chi square		
	Value	DF	Significance
Smoking	2.624	1	O.105

The above table explains the significance of smoking on liver abscess.

**Figure 10: Distribution of various risk factors associated with liver abscess**

The above figure shows the percentage distribution of various risk factors associated with the development of liver abscess. From the total population, majorly reported risk factor is alcohol with 88.35% of patients, other factors include male gender 83.3%, smoking 60%, age >50 years 56.6%, Hypertension 16.7% and 3.33% history of surgeries respectively.

**Figure 11: Distribution of liver abscess patients with various co morbidities**

The above figure demonstrates the percentage of patients with liver abscess having various co morbidities. From the total population, 5% of patients had pancreatitis, 20% of patients had type 2 Diabetes Mellitus, 16.75% of patients had Hypertension, and 5% of patients had acute kidney injury.

Table 8: Clinical features in patients with liver abscess

CLINICAL FEATURE	NO.OF CASES	PERCENTAGE
Abdominal pain	59	98.3
Fever	55	91.6
Cough	25	41.6
Jaundice	8	13.3
Weight loss	7	11.6
Diarrhoea	1	1.7
Vomiting	11	18.3
Hepatomegaly	46	76.66
Ascities	8	13.33
Pleural effusion	12	20
Peritonitis	1	1.7
Encephalopathy	2	3.33
Splenomegaly	3	5

The above table shows that various clinical features associated with liver abscess patients. Abdominal pain, fever and hepatomegaly are the majorly reported clinical features presented by the patients.

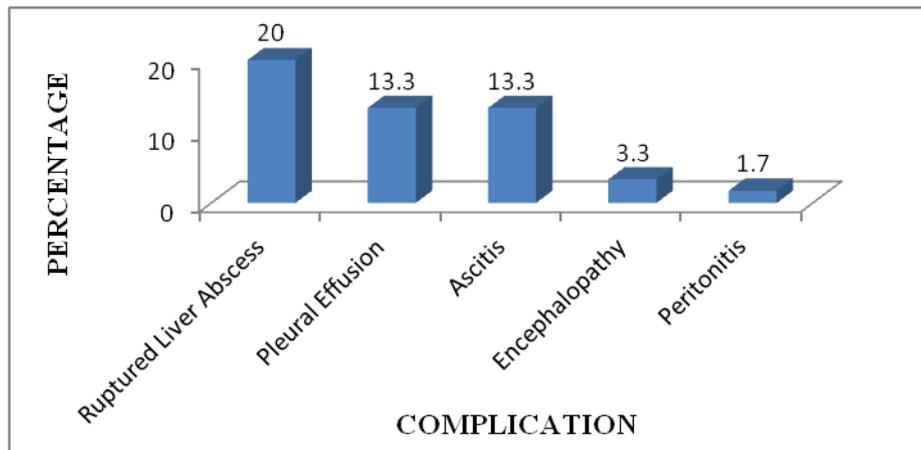


Figure 12: Complications associated with liver abscess

The above graph demonstrates various complications occurred in patients with liver abscess. From the total population 20% of patients had ruptured liver abscess, 13.3% of patients developed pleural effusion, 1.7% developed peritonitis, 13.3% had developed ascitis and 3.3% of patients had complications of encephalopathy.

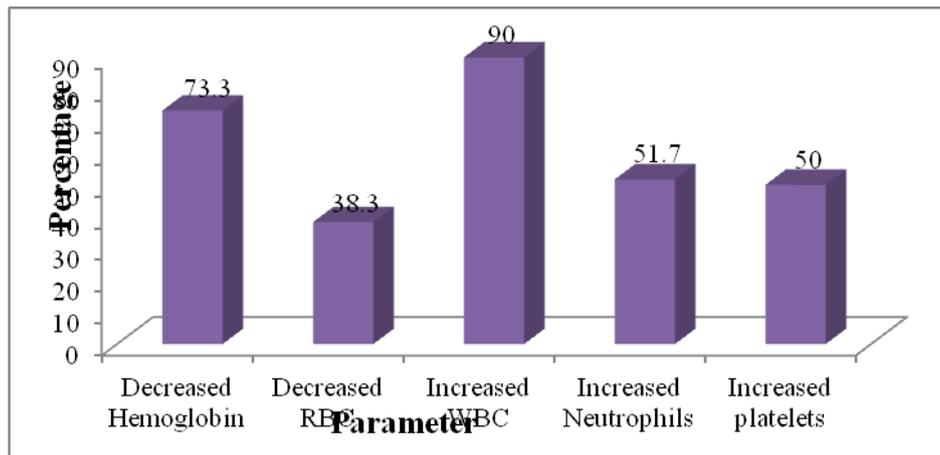


Figure 13: Altered CBP parameters in liver abscess patients

This graph shows the altered parameters of the Complete Blood Picture of the patients. 73.3% of total patients have decreased levels of haemoglobin, 3.8% of patients have decreased levels of RBC, 90% of patients have increased WBC levels, and 51.7% patients have increased neutrophils and 50% patient have increased platelet levels.

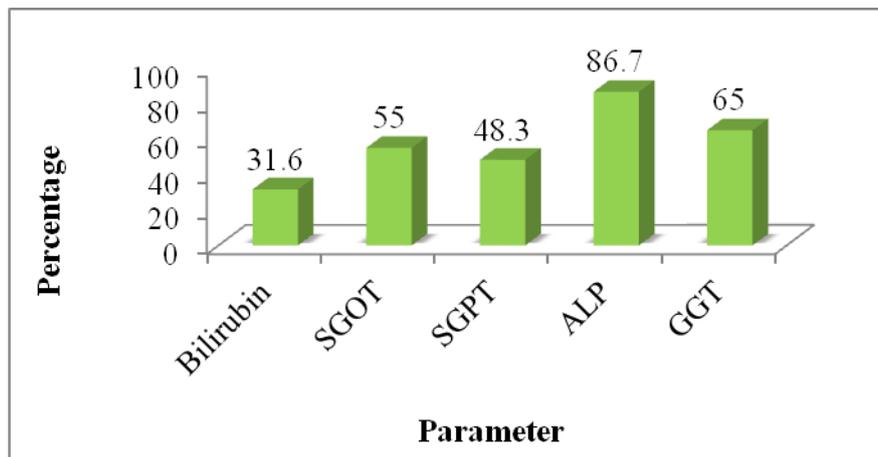


Figure 14: Elevated Liver Function Test parameters in liver abscess patients

The above graph shows the elevated parameters of liver function test of the liver abscess patients. 31.6% of the total population have elevated bilirubin levels, 55% of population have elevated SGOT levels, 48.3% of population have elevated SGPT levels, 86.7% of population have elevated ALP levels, and 65% of population have elevated GGT levels.

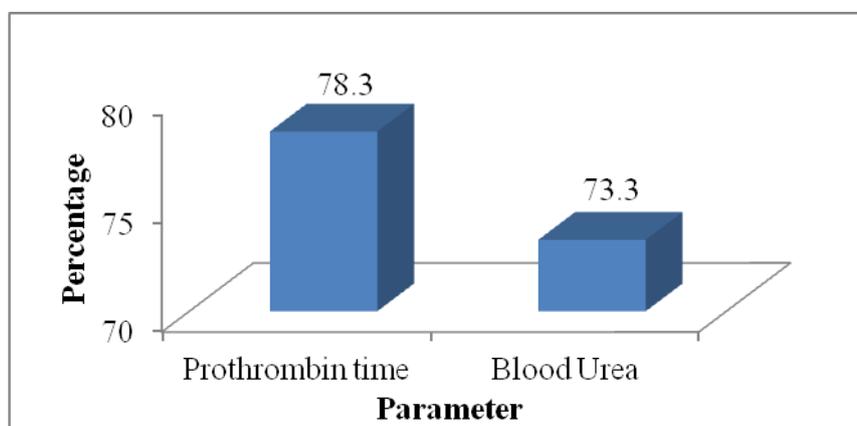


Figure 15: Altered blood parameters in liver abscess patients

There were 78.3% patients of total population had elevated levels of prothrombin time and 73.3% of total population had elevated blood urea levels as shown in above figure.

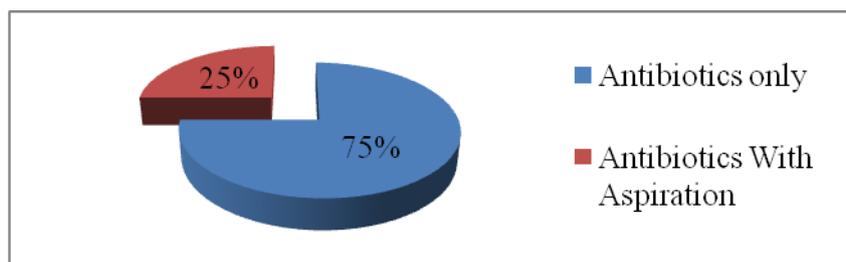


Figure 16: Treatment approaches for the management of liver abscess

The above chart demonstrates various treatment approaches considered for the management of liver abscess. 75% of the population was treated with only antibiotics and 25% of population were treated with antibiotics in combination with aspiration technique.

Table 9: Various antimicrobials prescribed for the management of liver abscess

ANTI MICROBIALS	FREQUENCY	PERCENTAGE
Metronidazole	59	98.30
Piperacillin + Tazobactam	9	15.00
Ceftriaxone	34	56.70
Ciprofloxacin	25	41.70

The above table shows the prescription pattern of anti microbials for the treatment of liver abscess. Major percentage of patients were given metronidazole (98.30) and ceftriaxone (56.70) followed by ciprofloxacin (41.70) and piperacillin + tazobzctum (15%).

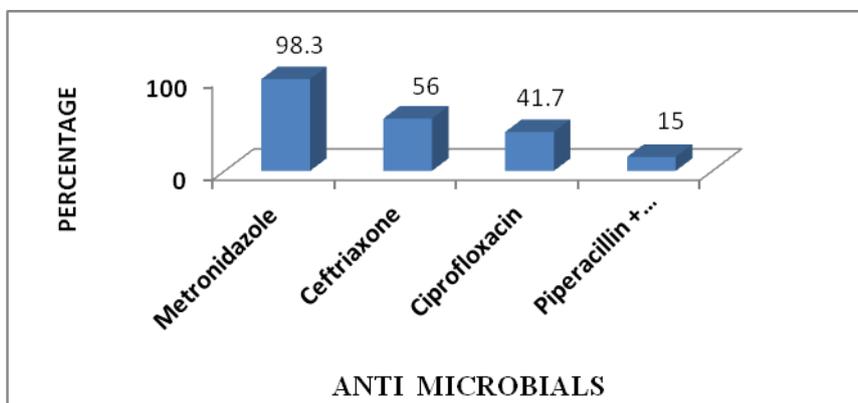


Figure 17: Anti microbials prescribed for the management of liver abscess

The above graph illustrates the prescribing pattern of anti microbials for the treatment of liver abscess. Metronidazole was the majorly prescribed drug which is given to 98.3% of patients, ceftriaxone was given to 56%, and ciprofloxacin to 41.7% and piperacillin + tazobactam was given to 15% of the patients.

Table 10: Nutritional supplements prescribed for liver abscess patients

NUTRITIONAL SUPPLIMENTS	FREQUENCY	PERCENTAGE
Vitamin K	26	43.30
Vitamin C	14	23.30
Multi vitamin tablet	34	56.70

The above explains the prescription pattern of various nutritional supplements to treat nutritional deficiencies of liver abscess patients. Major percentage of patients were given multi vitamin tablets (56.70), followed by vitamin K (43.30) and vitamin C (23.30).

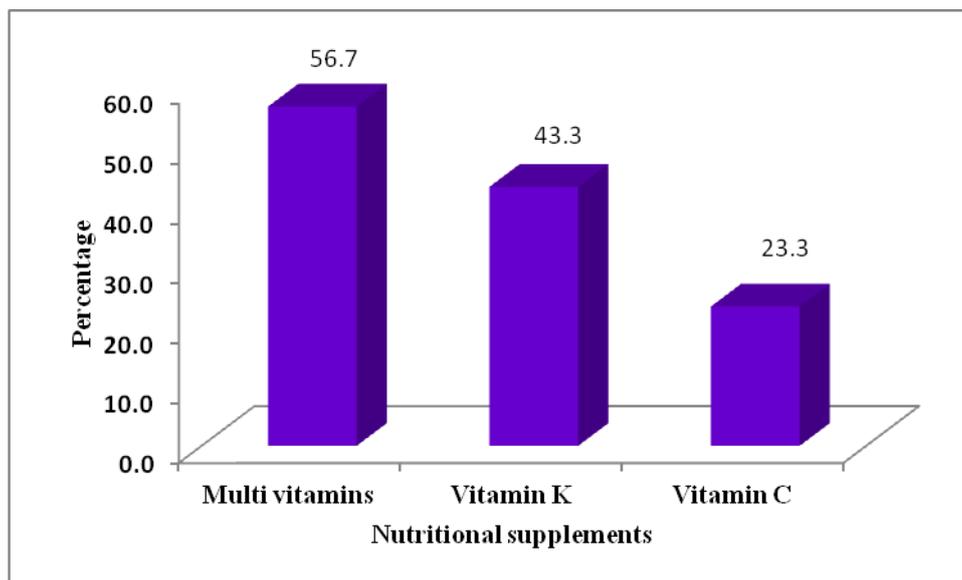


Figure 18: Prescribing pattern of nutritional supplements for liver abscess patients

The above graph depicts the prescribing patterns of various nutritional supplements for liver abscess patients. Majorities were given multivitamin tablets .i.e. 56.7%, vitamin K was given to 43.3%, and vitamin C was given to 23.3%.

Table 11: Medications prescribed to provide symptomatic relief for liver abscess patients

Other Medications	Percentage	Frequency
Tramadol	71.70	43
Pantoprazole	100.00	60
Ondansetron	15.00	9
Paracetamol	58.30	35

The above table shows prescription pattern of various medications for the symptomatic treatment of liver abscess patients. Major percentage of patients were given pantoprazole (100%), followed by tramadol (71.70%), paracetamol (58.30%) and ondansetron (15%).

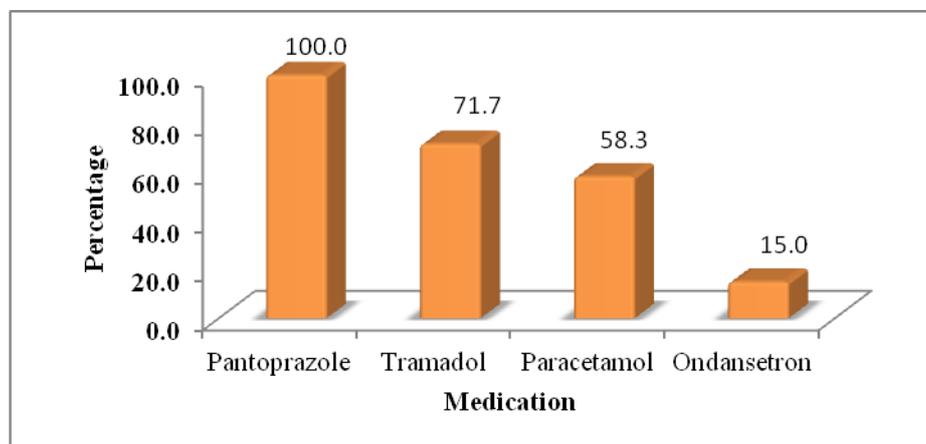


Figure 19: Prescribing pattern of medications for the symptomatic treatment of liver abscess patients

The above graph explains the prescribing pattern of drugs to provide symptomatic relief to liver abscess patients. All the patients in the study were given Pantoprazole i.e. 100%, tramadol was given to 71.7%, paracetamol given to 58.3% and ondansetron was given to 15% of patients.

DISCUSSION:

The study population accounted for the total of 60 patients diagnosed with liver abscess who were accessed for the presence of liver abscess symptoms and risk factors. From the total population included in the study 83% comprises of males and 17% comprises of females. The male to female ratio is 5:1 (Figure 1), therefore it is a clear indication that males are more affected compared to women. This might be due to Smoking and alcohol abuse commonly seen in men; these are the paramount risk factors which predisposes men to liver abscess. Males are significantly at the higher risk of developing liver abscess ($p < 0.05$). Our demographic data had some interesting trends. Mean age in our study was 49.55 years. In this study population, minimum and maximum ages of the patients affected with Liver abscess is 14 to 82 years respectively. More number of patients are reported from the age group 51-60 years (26.66%), and least number of patients are reported from the age group <20 and 81-90 years (table 5.1). It confirms that the population with age greater than 50 years is significantly at higher risk of developing liver abscess ($p = 0.03$).

Our study categorized the study population according to the socio-economic status (91.7%) (Figure 3). In countries like India it may be due to overcrowding and poor sanitary conditions which disposing population to liver abscess. Most of the patients included in the study population have normal weight (60%), and others include underweight (67.1%), overweight (30%) and obese subjects (3.3.1%) (Figure 4). Recent studies on liver abscess demonstrated a strong association between LA and poor economic status indirectly suggesting that the malnutrition is associated with the liver abscess cases. However, the lack of anthropometric data limited the ability of this study to draw conclusive casual association of liver abscess patients with poor nutritional status.

The diagnosis of the study subjects was done by using radiological techniques such as CT scan and an abdominal ultrasonography (USG). Etiological confirmation was done by using laboratory tests and culture techniques. Etiological analysis of LA revealed that 76.70% were of amoebic origin ($n=46$) and 23.30% are of pyogenic etiology ($n=14$) (Figure 6). All the patients of amoebic etiology reported with a single abscess where as 21.43% of patients of pyogenic etiology have single abscess

and 78.57 % of patients have multiple liver abscesses. It indicates that most liver abscess's of amoebic origin develop single abscess and most LA's of pyogenic origin develop multiple abscess. Most of the abscesses of both the etiologies are located in the right lobe of the liver (fig 5.7). From the demographic data of the patients, large numbers of LA's of amoebic origin are reported from the age group 61-70 years (35.71%) (Figure 8). It indicates that the most amoebic liver abscesses occur in young adults and pyogenic LA is more common in older people.

Our study analyzed the association between various risk factors and liver abscess. Large number of patients are reported with the alcohol consumption as risk factor(88.3%), followed by smoking (60%), age gender greater than 50 years (56.6%), DM (20%), HTN (16.7%) and history of surgery (3.3%).

Most common clinical features of liver abscess are pain abdomen and fever which were present in 98.3% and 91.6% of patients respectively. Various studies quote it in range 62-94% and 62-97% respectively. Chest radiography helped with the diagnosis of Liver abscess. Except for raised right hemi diaphragm giving some indirect clue of hepatomegaly, which was present in 76.66%. Another uncommon complain in liver abscess is cough. It is generally due to associated plural effusion and compression of the underlying lung parenchyma. It was presented by 41.6% of the patients. Other symptoms are weight loss and vomiting which were present in 11.6% and 18.3% respectively. Diarrhea in LA could be due to associated intestinal amoebiasis and could be a part of colonic condition predisposing to LA. It is not a common presentation; we reported it in 1.7% of patients. Previous studies report it variably from 4% to 33%. [13] Two uncommon signs of LA are jaundice and ascites. Jaundice was seen in 13.33% of the patients. In earlier studies from India, it was reported in 45-50% of patients. But after advent of good antimicrobial therapy, it has become less common. Sharma et al reported it in only 12.7% of patients. The other sign in frequently associated with liver abscess was ascites. It was present in 13.3% of patients. Cases have reported where liver abscess cause ascites by compressing the inferior vena cava.

Regarding the complications in the study, pleuropulmonary complications consist of pleural effusion and ascites accounted for the highest incidence of complications. 13.3% of patients had pleural effusion and 13.3% of patients had ascites. Pleuropulmonary complications are the most frequent complications of liver abscess. The theoretical mechanism involved is, first the infection usually spreads to the lung by direct

rupture of an abscess through the diaphragm. Second, the infection may disseminate to the thorax from primary intestinal lesion through hematogenous or lymphatic spread. 1.7% of patients had peritonitis. The rupture of the abscess into the peritoneal cavity may leads to spread of infection into the peritoneum and may also leads to ascites. 3.3% of the patients had encephalopathy.

The laboratory results had greater derangements. Majority of the patients had WBC count more than 11,000 (90%). There were 73.3% of the patients had anemia with haemoglobin levels less than 12mg/dl. 51.7% of the patients had increased neutrophil levels and 50% of the patients had raised platelet count. Other parameters which are affected in liver abscess are increased prothrombin time more than 13.5 seconds (78.3%) and elevated blood urea levels more than 20mg/dl (73.3%). Most marked liver function test abnormality in patients with liver abscess was abnormal alkaline phosphatase which is observed in 86.7% of the patients. 65% of the patients had elevated GGT levels. Other parameters got elevated are SGOT 55%, SGPT 48.3% and bilirubin 31.6%. Abnormally high alkaline phosphatase levels and GGT levels are the most reliable and consistent biochemical markers of liver abscess.

Consistent with the latest management strategy of drainage techniques, percutaneous aspiration was used in 25% of the patients. Hope et al reported 100% success rate for eight patients with unilocular abscess measuring <3 cm in diameter with antibiotics alone. The abscess measuring >5cm require invasive techniques like aspiration or surgical procedures. Appropriate antimicrobials were added according to the etiological outcome. Most commonly used antimicrobials are metronidazole account for 98.30% of the patients, ceftriaxone was given to 56.70% of the patients, followed by ciprofloxacin 41.70% and piperacillin + tazobactam was given to 15% of the patients (table 5.9). Various nutritional supplements were also prescribed for the patients to treat nutritional deficiencies which includes multivitamin tablet (56.70%), vitamin C (23.30%) and vitamin K was given to 43.30% of patients. Other medications given for the symptomatic relief include pantoprazole (100%), tramadol (71.70%), paracetamol (58.30%) and ondansetron (15%).

CONCLUSION:

- Amoebic liver abscesses are more common than pyogenic liver abscess.
- Solitary abscess are more commonly amoebic and multiple abscess are commonly pyogenic.
- The abscess is predominantly occurring in the right lobe of the liver.

- Male predominates in both amoebic and pyogenic liver abscess. Elderly were more commonly affected in pyogenic liver abscess while in amoebic abscess middle aged adults were involved followed by young adults. Though average age of the patients was in forties, increased incidence of liver abscess was noted in patients in the eighth decade. Liver abscess has a highly variable presentation.
- The typical features of liver abscess which include pain abdomen, particularly right upper quadrant as the commonest presenting feature of liver abscess along with fever and hepatomegaly. Various risk factors such as male gender, alcohol consumption and age > 50 years are predisposing the patients to liver abscess.
- Elevated WBC count, neutrophils, decreased hemoglobin, and increased prothrombin time; elevated SGPT and SGOT are commonly encountered in liver abscess. Abnormally high ALP and GGT levels are the most reliable and consistent biochemical markers of liver abscess.
- Untreated liver abscess is uniformly fatal which leads to complications such as pleura effusion, peritonitis, ascites and encephalopathy. The treatment of choice for PLA is a multi modal approach combining broad spectrum antibiotics and aspiration or drainage of abscess cavities.
- Amoebic liver abscess can be cured by metronidazole therapy without drainage.
- The key to successful outcome with both the approaches is early diagnosis and institution of appropriate therapy.

LIMITATIONS

- Anaerobic culture sensitivity for isolation of organisms was not done due to unavailability of anaerobic culture media.
- Aspiration technique was done to obtain the fluid for diagnosing the disease, but due to the thickness of the fluid as aspiration was not possible, the variation between amoebic and pyogenic couldn't be identified.
- Data regarding treatment before visiting hospital were not completely available.

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