Original Research Article

Liver abscess: demographic, clinical, biochemical, imaging and microbial spectrum

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ABSTRACT

Background: Liver abscesses are localized supplicative destruction of liver tissue due to infections of either bacterial (Pyogenic) or protozoa (Amoebic). Historically; pyogenic liver abscess has been described since the time of hippocrates (400 BC). Despite the more aggressive approach to treatment, the mortality rate remained at 60-80%.

Methods: This Cross-sectional analytical study carried out at Department of Medicine, Al-Tibri Medical College Hospital, Karachi, from June 2017 to December 2018. All participants of either gender with diagnosis of liver abscess were included in this prospective study. Patients with co morbidities like malignancy, autoimmune disease or on immunosuppressive treatment for any reason were excluded from the study. Following confirmation of the diagnosis; different characteristics of either type of liver abscess like demographic, clinical features, biochemical and imaging findings were evaluated.

Results: Data of 73 subjects, 65(89.0%) males and 08(11.0%) females were analyzed with mean age was 45.42±14.518 years. Fifty-four (73.97%) patients had pyogenic liver abscess while amoebic liver abscess was found in 19(26.03%) subjects. Clinically, the most common symptom was abdominal pain, found in 66(90.4%) subjects, followed by fever in 61(83.6%), hepatomegaly in 47(64.4%), jaundice in 18(24.7%) and vomiting in 10(13.7%) cases. Demographics and clinical features are shown in (Table 1).

Conclusions: Local trends have been changing and majority of liver abscess were of pyogenic liver abscesses. Clinically, clear differentiation between two types of abscesses is not possible always but few manifestations like typical symptoms, raised alkaline phosphatase and leucocytosis may be helpful.

Keywords: Amoebic, Liver abscess, Microbial, Pyogenic

INTRODUCTION

Liver abscesses are localized supplicative destruction of liver tissue due to infections of either bacterial or protozoa. In historical perspective; bacterial Pyogenic Liver Abscess (PLA) has been described since the time of hippocrates (400 BC), with the first published review by Bright appearing in 1936. In 1938, Ochsner's classic review heralded surgical drainage as the definitive therapy; however, despite the more aggressive approach to treatment, the mortality rate remained at 60-80%.1 PLA is caused by different types of micro-pathogens and its several risk factors have been identified, including diabetes mellitus, malignancy, splenectomy, herpes zoster and zolpidem use.2,6 Recently, although pathologic conditions of the biliary tract have been implicated as main etiologies of PLA; however, up to 55% of patients...
with PLA have no clear risk factors and these cases are called cryptogenic.\textsuperscript{7,9}

Another type of liver abscess is Amoebic liver abscess (ALA); it is the most common extra intestinal manifestation of amebiasis. Globally, about 50 million symptomatic cases of amebiasis occur worldwide each year, resulting in 40,000 to 100,000 deaths annually.\textsuperscript{10} Mortality from amebiasis is mainly due to extra-amoebic colitis, of which ALA is the most common. In recent years, clinically diagnosed ALA has been emerged one of the two most important parasitological public health problems (second only to malaria) in Jaffna, northern Sri Lanka.\textsuperscript{11,13} Amebae establish hepatic infection by ascending the portal venous system.\textsuperscript{14}

Clinically; both types of liver abscesses usually present with similar picture ranging from malaise to fever, chills, abdominal pain, and vomiting. Hence it is very difficult to differentiate clinically these two types of liver abscesses. Furthermore; the differentiation is essential for certain reasons; firstly, medical treatment is entirely different for each type; secondly, pyogenic subtype requires prompt treatment because of its comparatively aggressive nature and high mortality rate.

This study was aimed to assess demographic and clinical features along with biochemical, imaging findings of both types of liver abscesses and also to some extent microbial spectrum of pyogenic liver abscess.

**METHODS**

All patients of either gender with diagnosis of liver abscess either visited outpatient department or admitted in the Medical Units of a tertiary care Hospital; Al-Tibri Medical College Hospital, Karachi, during June 2017 to December 2018 were included in this prospective study. Due approval of study protocol was obtained from the Ethics Committee of the Institution and all patients provided written informed consent to participate in the study. Patients with co morbidities like malignancy, autoimmune disease or on immunosuppressive treatment for any reason were excluded from the study.

For fulfillment of inclusion and Exclusion criteria all the patients underwent of detailed history, meticulous clinical examination and routine laboratory investigations. Following routine laboratory work up, the diagnosis and differentiation of either type of liver abscess was made with more specific laboratory tools like, microbial culture of blood and/or abscess, antibodies to Entamoeba histolytica by an Indirect Hemagglutination (IHA) assay and in selected subjects, Computed Tomography (CT) Scan. Following the confirmation of diagnosis of either type of liver abscess; the different variables like demographic and clinical features were assessed along with biochemical, imaging findings were recorded in preformed proforma and these characteristics of both types of liver abscesses were evaluated.

**Statistical analysis**

For evaluation of the differences between demographic data for two types of liver abscesses, the Chi square test was used for categorical variables and student’s t-test for quantitative variables. Results with $p$-values <0.05 were considered as statistically significant.

**RESULTS**

Data of 73 subjects, 65(89.0\%) males and 08(11.0\%) females was analyzed. The overall mean age was 45.42±14.518 years with a range of 25-75 years while on the basis of type of abscess, the pyogenic group had higher mean age (49.19±13.498) as compare to amoebic liver abscess group (34.74±11.985) of subjects. Of the 73 patients with confirmed diagnosis of liver abscess, 54(73.97\%) patients had pyogenic liver abscess while amoebic liver abscess was found in 19(26.03\%) subjects.

Regarding presenting clinical features, the most common symptom was abdominal pain, found in 66(90.4\%) subjects, followed by fever in 61(83.6\%) cases hepatomegaly in 47(64.4\%) patients, jaundice in 18(24.7\%) cases, vomiting in 10(13.7\%) cases and respiratory symptoms especially rhonchi was noticed in 07(9.6\%) subjects. Diabetes mellitus was the most common comorbid found in 21 subjects and observed more common in pyogenic group of patients 18 versus 03 in amoebic group of cases but statistically that difference was not significant. Demographic and clinical features of all 73 study subjects with either type of liver abscess is shown in (Table 1).

Occupation wise; majority were laborer 27(36.98\%), followed by driver 11(15.06\%), tailor 07(9.6\%), miscellaneous 05(6.8\%) while in females 07 (out of total 08 females) were housewives. Addiction was found in 43(58.90\%) subjects; 13(17.8\%) were smokers, 11(15.1\%) were addictive of pan/chahalia, 09(12.3\%) of naswar/snuff tobacco, 07(9.6\%) of alcohol while 03(4.1\%) subjects had previous history of smoking. (Table 1). Laboratory results revealed some important findings especially in liver function tests. Alkaline phosphatase mean was found higher in subjects having multiple abscesses (769.347±694.909) as compare to patients with single abscess (402.84±588.929). Pyogenic liver abscess patients shown a significantly higher mean WBC count in comparison to amoebic liver abscess subjects (15.790±7.173 vs 9.184±2.372) (p<000.1).

Microbial status of study subjects revealed form pus and/or blood culture revealed the commonest organism was Klebsiella pneumoniae found in 28(51.85\%) among pyogenic liver abscess followed by Polymicrobial in 13(24.07\%), Escherichia coli in 07(12.96\%), cryptogenic (no growth and negative amebic serology) in 06(11.1\%) while Streptococci viridans was found to be culprit agent in 05(9.26\%) subjects of pyogenic liver abscess. Five patients with cultures positive for bacteria
but also with very high IHA titers were included in the amoebic group and were labelled as amoebic abscesses with superimposed bacterial infection. Laboratory, imaging and microbial spectrum of study subjects was shown in (Table 2).

Table 1: Demographic and clinical characteristics of liver abscess patients.

| Variable          | N (%)                      | Pyogenic 54(73.97%) | Amebic 19(26.03%) | p-value |
|-------------------|----------------------------|---------------------|-------------------|---------|
| Gender            |                            |                     |                   |         |
| Males             | 65(89%)                    | 48(88.9%)           | 17(89.5%)         | 1.000   |
| Females           | 08(11%)                    | 06(11.1%)           | 02(10.5%)         |         |
| Age (years)       |                            |                     |                   |         |
| ≤50               | 51(69.9%)                  | 36(66.7%)           | 15(78.9%)         | 0.393   |
| >50               | 22(30.1%)                  | 18(33.3%)           | 04(21.1%)         |         |
| Addiction         |                            |                     |                   |         |
| Yes               | 43(58.9%)                  | 30(55.6%)           | 13(68.42%)        |         |
| No                | 30(41.1%)                  | 24(44.4%)           | 06(31.58%)        |         |
| Fever             |                            |                     |                   |         |
| Yes               | 61(83.6%)                  | 46(85.2%)           | 15(78.9%)         | 0.497   |
| No                | 12(16.4%)                  | 08(14.8%)           | 04(21.1%)         |         |
| Abdominal pain    |                            |                     |                   |         |
| Yes               | 66(90.4%)                  | 48(88.9%)           | 18(94.7%)         | 0.665   |
| No                | 07(9.6%)                   | 06(11.1%)           | 01(5.3%)          |         |
| Yellowish pain    |                            |                     |                   |         |
| Yes               | 18(24.7%)                  | 12(22.2%)           | 06(31.6%)         | 0.537   |
| No                | 55(75.3%)                  | 42(77.8%)           | 13(68.4%)         |         |
| Vomiting          |                            |                     |                   |         |
| Yes               | 10(13.7%)                  | 06(11.1%)           | 04(21.1%)         | 0.275   |
| No                | 63(86.3%)                  | 48(88.9%)           | 15(78.9%)         |         |
| Hepatomegaly      |                            |                     |                   |         |
| Yes               | 47(64.4%)                  | 34(63.0%)           | 13(68.4%)         | 0.784   |
| No                | 26(35.6%)                  | 20(37.0%)           | 06(31.6%)         |         |
| Rhonchi           |                            |                     |                   |         |
| Yes               | 07(9.6%)                   | 05(9.3%)            | 02(10.5%)         | 1.000   |
| No                | 66(90.4%)                  | 49(90.7%)           | 18(89.5%)         |         |

NS- Non-significant

Table 2: Laboratory, imaging and microbial spectrum of liver abscess patients.

| Characteristic          | N (%)                      | Pyogenic 54(73.97%) | Amebic 19(26.03%) | p-value |
|-------------------------|----------------------------|---------------------|-------------------|---------|
| CBC (Mean±SD)           |                            |                     |                   |         |
| HB (G/DL)               | 11.460±1.3884              | 11.415±1.502        | 11.589±1.019      | 0.577   |
| WBC (×103/ml)           | 14.071±6.914               | 15.790±7.173        | 9.184±3.372       | <0.0001 |
| PLT (×103/ml)           | 248.205±79.7276            | 254.537±86.854      | 230.210±51.849    | 0.153   |
| LFTS (Mean±SD)          |                            |                     |                   |         |
| Bilirubin (MG/dl)       | 2.401±2.407                | 2.123±2.0995        | 3.193±3.051       | 0.170   |
| ALT (IU/ml)             | 64.329±35.097              | 60.222±33.364       | 76.000±38.401     | 0.122   |
| ALP (IU/ml)             | 518.315±624.139            | 579.07±676.540      | 345.631±409.827   | 0.082   |
| Albumin (G/dl)          | 3.278±0.6267               | 3.276±0.650         | 3.284±0.5698      | 0.958   |
| Abscess features        |                            |                     |                   |         |
| Location               |                            |                     |                   |         |
| Right 45 (61.6%)        | 32 (59.3%)                 | 13 (68.4%)          |                   |         |
| Left 13 (16.6%)         | 09 (16.7%)                 | 04 (21.1%)          |                   |         |
| Both 15 (20.5%)         | 13 (24.1%)                 | 02 (10.5%)          |                   |         |
| Number                 |                            |                     |                   |         |
| Single 50 (68.5%)       | 35 (64.8%)                 | 15 (78.9%)          |                   |         |
| Multiple 23 (31.5%)     | 19 (35.2%)                 | 04 (21.1%)          |                   | 0.198   |
| Culture of abscess/blood culture 54 (74%) | 54 | 00 | -- |
| Klebsiella pneumonia 28 (51.85%) | | | |
| Polymicrobial 13 (24.07%) | | | |
| Escherichia coli 07 (12.96%) | | | |
| Cryptogenic 06 (11.11%) | | | |
| Strepococci viridans 05 (9.26%) | 05 | | |
| Amebic serology 19 (26%) | | | |

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DISCUSSION

An impending life-threatening condition associated with liver abscess is of pyogenic nature, with high mortality and morbidity. Worldwide frequency of pyogenic liver abscess is around 1.1-2.3 per 100,000 person-years. While in China the incidence rate of 5.7 per 100,000 populations. In this study, 65.9% of males were affected with liver abscesses. The overall mean age was 45.42±14.5 years, while on the basis of variety of abscess, the pyogenic group had higher mean age (49.19±13.498) as compare to amoebic liver abscess group (34.74±11.985) of subjects. However, the mean age in the previous study by Zhu X was 59.6±12 years. This inconsistency might be due difference in socioeconomic status, lack of sentence and health care provision of the studied subjects.

This study results revealed that males were more commonly affected with pyogenic liver absceses in 48(88.9%) of the patients in contrast to females 06(11.1%) and this finding of male gender dominancy was in agreement to previous studies by Baig A et al, who had demonstrated 76.6% males in their study and Chen YC et al, found in their study that 63.6% of males were affected with pyogenic liver abscess. This male gender dominancy was common in those studies but with variation in value might be due to the different socioeconomic status of the subjects and different study design.

The percentage of amoebic liver abscess to pyogenic liver abscess relies on the landscape of the revealing institution. In Pakistan, amoebic liver abscess is substantially more typical as compared to pyogenic abscess. In this study pyogenic liver abscesses was present in 54(73.97%), this was in dissimilarity to the previous study that demonstrated 46(88%) of amoebic liver abscess that might be due to comparatively the small sample size and the precipitating risk factor of diabetes mellitus was not declared in previous study by Ahsan.

Most common complaints in this study was abdominal pain in 66(90.4%) followed by fever present in 61(83.6%) especially with pyogenic abscesses. The utmost common signs observed were hepatomegaly in 47(64.4%), while jaundice observed in 18(24.7%) of subjects. This was in inconsistency to Tian study that analyzed the diabetic and non-diabetic cases with liver abscess that revealed 47% and 52% respectively with abdominal pain while fever was present in 86% and 90% respectively and the difference could be due to diverse climatic region.

Most common and important liver function abnormality in this study was raised alkaline phosphatase in overall both types of abscesses but more in pyogenic liver abscess (579.07±676.540) as compare to amoebic liver abscess 345.631±409.827 and this finding was in support of study by Lodhi et al, who shown higher mean ALP in pyogenic vs amebic liver abscess (236 vs 211) but statistically those differences were insignificant. No significant difference was found in serum bilirubin, ALT and serum albumin between two types of abscess. Leukocytosis help to differentiate between the nature of liver abscess. In this study mean leukocyte count was 15.790±7.173 in pyogenic abscess in contrast to amoebic liver abscess 9.184±2.372 with a significant p value of <0.0001. This finding of higher leukocyte count in pyogenic liver abscess was in agreement to study conducted by Serraino C et al.

When pus was obtained and cultured from the abscess or blood cultures from patients with pyogenic liver abscesses revealed Klebsiella pneumoniae was the dominant organism found in 28(51.85%) subjects followed by polymicrobial in 13(24.07%), Escherichia coli in 07(12.96%) and cryptogenic (no growth) in 06(11.1%). K. pneumoniae being a commonest culprit was also supported by different studies carried out in Asian countries like Taiwan, China, Korea, Singapore and Pakistan.

In previous span the diagnostic imaging has assumed a foremost role in initial diagnosis of liver abscess and because of enhancement in the ground of ultrasonography it has turned in to a standard for detection of liver abscess. In this study right lobe involvement was present in most commonly of 45(61.6%) with both types of liver abscesses but predominantly pyogenic liver abscess (59.3%) as compare to the left in 3(16.6%) while both lobes involvement was present in 15(20.5%). This right lobe dominancy was also evidenced by Lodhi et al, in their study with 73% of pyogenic and 57% of amebic liver abscesses were found in right lobe followed by left lobe.

There were few limitations of this study; first, single center-based study with limited sample size hence results can not represent whole population. Second, treatment outcomes of all subjects were not available hence prognosis couldn’t be analyzed.

CONCLUSION

Current study highlighted that trends have been changing and majority of liver abscesses were of pyogenic liver abscesses while male dominancy because of particular lifestyle still remain same.

Although clear differentiation between amoebic and pyogenic abscesses on clinical grounds or routine lab tests is not possible always but even though few manifestations like typical symptoms, raised alkaline phosphatase and leukocytosis may be helpful.

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