A demographic, clinical and imaging description of patients with liver abscess at a referral hospital in Colombia

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Abstract

Introduction: liver abscess (LA) is a local infectious process which may have a bacterial or amoebic etiology. Its incidence has been rising, causing an impact on healthcare systems. An estimate of its current status in Colombia is needed. The proposed objective is to describe the demographic, clinical and imaging characteristics of patients with LA at a referral hospital in Colombia.

Method: a descriptive, retrospective observational study of patients with LA seen between January 2012 and October 2022. The data were presented using relative and absolute frequency measures and measures of central tendency. The information was obtained from electronic medical records, and the statistical analysis was done using Stata 17.

Results: a total of 154 patients were included, with an average age of 57.5 years, 65.5% of whom were male. Altogether, 43.5% had comorbidities, 5.8% had a history of immunosuppression, and 6.4% had prior corticoid use. The most common symptom was abdominal pain, with 87.1% of cases. A total of 62.3% had abnormal laboratory results (elevated liver enzymes, leukocytosis or neutrophilia). The most frequent location on imaging was the right lobe, with a single image found in 70.1% of the cases. The microbiological profile was mostly negative (86.3%), with *Gram negative germs and E. coli* found in 4.5%, respectively. Most abscesses were drained (59.7%), with an average hospital stay of 12.9 days and a mortality of 1.9%.

Conclusions: our results are similar to what the literature describes about liver abscesses. More studies are needed to describe the clinical and financial impact on the healthcare system. **(Acta Med Colomb 2023; 48. DOI: https://doi.org/10.36104/amc.2023.2845).**

Keywords: *liver abscess, Entamoeba histolytica, clinical diagnosis, abdominal pain, drainage*.

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Introduction

A liver abscess (LA) is a local infectious process characterized by fever, tenderness in the right upper quadrant, nausea, vomiting, diarrhea and abdominal pain. It has a 2-12% mortality rate. The responsible pathogens are bacteria and parasites (*Entamoeba histolytica*), giving rise to two types of LAs: pyogenic and amebic, respectively (1).

Over the last few years, the incidence of bacterial LA has steadily increased from 1.1/100,000 to 17.6/100,000 individuals, especially LAs caused by *K. pneumoniae* (2). The most frequently found bacterial agents are *Streptococcus spp*. (29.5 %) and *E. coli* (18.1 %). In patients over the age of 64, LA is more common in women and in people with a history of biliary disease, and *E. coli* is the most common bacteria. Mortality was also higher in this age group (3). The diagnosis is made based on clinical suspicion and subsequent confirmation with laboratory and imaging tests such as abdominal ultrasound, abdominal computed axial tomography and abdominal magnetic resonance imaging. The treatment of choice for LAs is prompt antibiotic treatment coupled with percutaneous drainage. Surgical drainage is performed if percutaneous drainage fails or complications arise (4).

Despite the availability of accessible diagnostic methods and treatments, LAs continue to cause high morbidity and mortality in developing countries (5). The global burden of LAs is unknown to date, and therefore there is an evident need for academia to construct conceptual inputs for LAs, using its own and real-world information. This study sought to describe the demographic, clinical and imaging characteristics of patients with LAs at a referral hospital in Colombia.

Method

Study design and data extraction. This was a retrospective, observational, descriptive study carried out at a referral

center in Colombia. Non-probability convenience sampling of patients who were treated for LAs between January 2012 and October 2022 was conducted.

Data collection. A retrospective review was performed of electronic charts, laboratory results, microbiology reports and imaging findings. To ensure the accuracy and reliability of the gathered data, the research team collected the data using strict quality control.

Variables. The following variables were considered in the analysis: sociodemographic characteristics, clinical manifestations and characteristics, coexisting conditions and comorbidities, number and location of abscesses, laboratory test results, microbiological findings, diagnostic and treatment methods, responses to treatment, length of hospital stay and mortality.

Definitions. Patients were included if they had suspected LA with confirmatory clinical studies, both microbiological studies with a culture report as well as imaging findings consistent with an abscess. Likewise, the diagnostic criteria for LAs (6) were considered within each patient´s diagnostic evaluation.

Statistical analysis. Descriptive analyses were used to report the characteristics of the population according to the nature of the variable and distribution of the data. Frequencies and percentages were used to describe categorical variables. Measures of central tendency and dispersion were used to describe numeric variables. The statistical analysis was performed using Stata 17.

Ethical issues. This study was approved by the Institutional Research Committee, in accordance with national and international regulations.

Results

Baseline characteristics

A total of 241 medical charts were reviewed, finding 154 patients with a confirmed diagnosis. As shown in Table 1, this population had an average age of 57.5 years, with a 65.5% male predominance. In addition, approximately 43.5% had some type of comorbidity, with hypertension, cancer and diabetes mellitus being the most frequent. There were also some patients with a history of immunosuppression and immunodepression, accounting for almost 5.8% of the overall population, and 6.4% of the patients had a history of corticosteroid use.

Clinical aspects

On another note, the expected signs and symptoms of LA were logged, with the most prevalent being abdominal pain, fever, jaundice, and diarrhea or dysentery. Most of the patients presented with only one symptom, and only one sign was found on exam. The results are summarized in Table 2.

Laboratory and imaging aspects

Likewise, the tests and imaging procedures carried out on admission or during hospitalization are presented. Table 3 shows elevated liver enzymes, leukocytosis and neutrophilia as a common pattern in the patients at our center. Regarding ultrasound results, the LAs were mostly found in segments of the right lobe, with 62.3%. Most of the LAs were also found to have a single image, in 70.1% of the cases. As microbiological profile findings, approximately 86.3% had negative cultures, while Gram-negative bacilli and *E. coli* accounted for 4.5% each, followed by *K. pneumoniae* and opportunistic microorganisms with 1.2%, respectively.

Clinical outcomes

Finally, the most important outcomes were evaluated to determine the impact of LAs. For example, treatment was mainly medical, coupled with drainage in 59.7% of cases. There was an average hospital stay of 12.9 days, ranging from 0 to 120 days in the most severe cases, and even mortality was recorded, representing 1.9% of the study population.

Table 1. *Sociodemographic characteristics of patients diagnosed with liver abscess in a quaternary care hospital in Bogotá, Colombia.*

Variable	Statistic
Average age (range)	57.51 (23-94)
Male sex n, (%)	101 (65.5)
Comorbidities n, (%)	Total: 67 (43.5) Hypertension 36 (23.3) Diabetes mellitus 12 (7.7) Chronic kidney disease 0 Liver disease 4 (2.5) Cancer 15 (9.7)
Type of inmunosuppression n, (%)	Total: 10 (5.8) Cancer 2 (1.2) Chemotherapy 5 (3.2) Liver transplant 1 (0.6) HIV 1 (0.6)
Number of immunosuppressants n, (%)	One 10 (6.4)

Table 2. *Signs and symptoms of patients diagnosed with liver abscess at a quaternary care hospital in Bogotá, Colombia.*

Symptoms n, (%)	Statistic	Signs n, (%)	Statistic
Anorexia	0	Fever	85 (55.1)
Abdominal pain	134 (87.1)	Right upper quadrant tenderness	0
Weight loss	11 (7.1)	Epigastric tenderness	0
Right chest pain	10 (5.8)	Right lung base signs	0
Diarrhea or dysentery	31 (21.1)	Jaundice	33 (21.4)

Table 3. *Laboratory results of patients diagnosed with liver abscess at a quaternary care hospital in Bogotá, Colombia.*

Laboratory results (range)	Statistic
Average aspartate aminotransferase	68.5 (13-352)
Average alanine aminotransferase	75.2 (9-400)
Average bilirubin	1.2 (1-2)
Average alkaline phosphatase	190.1 (8-646)
Average albumin	0.93 (4 patients)
Average leukocytes	15.7 (2-25)
Average neutrophils	13.1 (1-20)
Imaging findings n, (%)	
Right side (segments 5-8)	96 (62.3)
Left side (segments 1-4)	43 (27.9)
Identification of a single abscess	108 (70.1)
Identification of multiple abscesses	41 (26.6)
Microbiology culture result n, (%)	
Gram negative bacilli	7 (4.5)
Escherichia coli	7 (4.5)
Klebsiella pneumoniae	2 (1.2)
Enterobacter cloacae	1 (0.6)
Gram-positive cocci	1 (0.6)
Opportunistic *(Veillonella parvula* and *actinomyces odontolyticus)* *(Streptococcus anginosus and Citrobacter freundii)*	2 (1.2)
Negative result	133 (86.3)

Table 4. *Outcomes in patients diagnosed with a liver abscess at a quaternary care hospital in Bogotá, Colombia.*

Variable	Statistic
Type of treatment n, (%)	Medical 43 (27.9)
	Medical and drainage 92 (59.7)
	Medical, drainage and surgical 18 (11.6)
Average hospital stay (range)	12.9 (0-120)
Outcome n, (%)	Discharge 151 (98.1) Death 3 (1.9)

Discussion

This is the first study to describe the demographic, clinical and imaging characteristics of patients with LAs at our center. It is essential to highlight the importance of early clinical suspicion in order to give prompt treatment, as these are productive adult patients who generally have comorbidities and, to a lesser degree, have a history of immunosuppression. Its strengths include the number of subjects enrolled, with a 10-year follow-up, obtaining complete clinical data and real-time outcomes.

Regarding the patients' sex and age demographic characteristics, the male sex continues to predominate, and the most frequent age group was those around 50 years of age, as reported by Meddings et al. (7), although in our study the average age was closer to 50 years, while Meddings et al. (7) found a predominance in those over the age of 65. For comorbidities, our most frequent finding was hypertension followed by diabetes mellitus, just like cohorts in New Zealand studied by Kubovy et al. (8), who also reported these conditions most frequently in a smaller group of patients.

The most frequent signs and symptoms found in our cohort were the triad of fever, abdominal pain and elevated transaminases, which is very similar in other studies such as Zhang et al.'s (9), even comparing them across different age groups. In other populations, like those in Europe, fever and abdominal pain are more often predominant; Serraino et al. (10) found these signs in 73 and 63% of patients, respectively, similar to our cohort, despite having fewer patients.

Various studies, like Kaplan et al's (11) have reported *Klebsiella pneumoniae* and *Streptococcus millieri* as the main pathogens. These findings are similar to those of Chung et al. (12), who even reported a predominance of the K1 serotype. Meanwhile, in Calgary, the main microorganism isolated by Losie et al. (13) was *Streptococcus spp* followed by *Klebsiella pneumoniae*. These findings are similar to those of our study, in which *Escherichia coli*, *Klebsiella pneumoniae* and *Streptococcus spp*. were the most common.

A noteworthy finding of our study is the high percentage of negative cultures, close to 80%, compared to other cohorts such as Chung et al.'s (12) who reported 10%, Yin et al. (14) with 20%, Kumar et al. (15) with 20%, Yu et al. (16) with 30%, Alkomos et al. (17) with 39%, and Neil et al. (18) also with 39%. This shows that the sensitivity of cultures varies, and is even a cause for concern, as in Yao et al.'s (19) study comparing outcomes between groups with positive vs. negative cultures.

The LA phenomenon has been addressed by authors like Yoon et al. (20), who reported these findings mainly in patients over the age of 65, with a p=0.02, and in patients with biliary obstruction. Yoon et al.'s (20) findings are similar to those reported by Hao et al. (21), in which the average age of LA with negative cultures was close to 53 years vs. 58 years with positive cultures. These studies could explain our cohort's findings, as the average age was closer to 55 years, compared to the previously mentioned studies which had approximately 40% negative cultures and an average age of 65 years.

The treatment reported in different studies included antibiotic therapy, of course, but we also found a very similar percentage for surgical treatment/drainage, which was mainly performed by an interventionist radiologist, with 67% reported by Serraino et al. (10), and even in much larger cohorts such as Yin et al.'s (14), in which approximately 65% of the patients underwent single or multiple drainages.

As is to be expected, some of the results are biased due to data recording, as this was a retrospective chart review. Therefore, this design characteristic was considered in the interpretation of the data obtained. Some variables were found to have a higher rate of missing data; however, we believe that this study is a first step in producing local evidence on LAs in our context. Likewise, a large percentage of articles on this topic published thus far have focused on descriptive

analyses of the population in certain regions. Therefore, collaborative scientific production is important for this disease, as this is useful clinical information that has not yet been standardized. More local evidence is needed to identify the clinical patterns of LAs in the Colombian population.

The strengths of this study are the sample size, with 154 patients over a 10-year follow-up period with complete clinical data. Inconsistent data was verified manually in the laboratory reporting system, producing more reliable results for the study. Selection bias was mitigated by eliminating patients with incomplete data, misclassification bias was mitigated by using the standardized diagnostic criteria, and information/measurement bias was mitigated by classifying the variables to be included beforehand.

Our study's limitations include the fact that the results are not comparable with other national settings, as the included patients were part of high-complexity center in the nation's capital. The SARS-CoV-2 pandemic restrictions caused difficulties in healthcare provision during the study period, as well as for data collection. Furthermore, being a single-center study based on information gathered retrospectively from electronic medical charts, the quality of the information may be restricted. In addition, the findings are not comparable with those in the nation's periphery in various aspects, especially laboratory, imaging and clinical outcomes.

Conclusion

Our study shows the sociodemographic and clinical characteristics of patients with LAs at the selected referral hospital, whose results correlate with the characteristics described in the literature. Further efforts must be made using studies with more epidemiological power to characterize the short and medium-term clinical impact and identify LA patterns in the Colombian population, as well as studies to describe the economic impact on the healthcare system, to establish better clinical outcomes and cost-effectiveness.

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