

## Alteration in Liver Function Biomarkers among Patients Infected with *Entamoeba histolytica* at Tikrit City

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**Abstract:** *Entamoeba histolytica*, often known as *E. histolytica*, is a facultative protozoan parasite that is linked to amoebic liver abscesses, which are the most common extraintestinal manifestation of this infection. This study aims to ascertain the levels of liver enzymes, specifically alanine aminotransferase (ALT), aspartate aminotransferase (AST), and alkaline phosphatase (ALP), in patients infected with *E. histolytica*. This study involved collecting 90 stool samples from patients with diarrhea at Tikrit Teaching Hospital between September 2025, and January 2026. The patients ranged in age from 1 to 12 years and included both sexes. The results showed an overall infection rate of *E. histolytica* 61.1%. The infection rate among males was 59.1%, while it was 63% among females. The results of the study, indicate significant difference in ALT and AST level in patients infected with *E. histolytica* ( $33.18 \pm 5.03$ ,  $37.50 \pm 5.32$ ) as compared with control at a p-value  $< 0.05$ . While non-significant differences in ALP in patients infected with *E. histolytica* as compared with control at a p-value  $> 0.05$ . In conclusion, *E. histolytica* infection was associated predominantly with hepatocellular enzyme alterations. Routine liver function testing may aid in the early detection of hepatic involvement in amoebiasis, even in the absence of overt liver disease.

**Keywords:** Amoebiasis, Hepatoenzymes, Pediatrics

### Introduction

The non-flagellated, facultative protozoan enteropathogen known as *Entamoeba histolytica* (*E. histolytica*) is responsible for the condition that affects fifty million people all over the world annually [1]. Most species of *Entamoeba* live in the human intestine. Amoebiasis is known as an infection caused by *E. histolytica*, and it causes serious illness and death in humans [2].

*E. histolytica* is a common parasite causing what is called Amoebic dysentery. It is estimated that there are (480) million infections, causing (40,000 - 110,000) deaths annually in the world. This disease comes in third place after malaria and schistosomiasis in causing deaths [3]. The active Trophozoite stage that causes the disease lives in the wall and lumen of the large intestine, especially the cecum and the ends of the small intestine, where it causes intestinal thrombosis, hemorrhage, intestinal stricture, and granuloma, and may cause appendicitis [4].

Hepatocellular damage and tissue destruction are caused by the hematogenous propagation of trophozoites from the colon to the liver through the portal circulation, where host immunological responses, inflammatory mediators, and parasite-induced cytotoxicity all work together [5], [6]. Changes in liver function parameters during amoebic liver infection have been documented in a number of clinical and experimental studies; however, the type and extent of these biochemical disruptions may differ depending on the severity of the disease, length of infection, host immune status, and underlying hepatic condition [7].

This study aims to ascertain the levels of liver enzymes, specifically alanine aminotransferase (ALT), aspartate aminotransferase (AST), and alkaline phosphatase (ALP), and their correlation with *E. histolytica* infection.

## Materials and methods

### Subject

Ninety stool samples were obtained from patients at Tikrit Teaching Hospital experiencing diarrhea, including cases of bloody diarrhea. The study period spanned from September 1, 2025, to January 31, 2026. Their ages varied from 1 month to 12 years, encompassing both genders.

### Microscopic Examination

The examination was performed by placing a drop of physiological saline solution on one end of a glass slide and a drop of local iodine solution on the other end. A small amount of feces, about the size of a matchhead, was collected from several locations using a clean wooden stick. The slide was then covered and examined under a light microscope with a 1000X oil lens to confirm the presence of the parasite(8).

### Sample collection

A medical syringe was used to take five milliliters of venous blood from the study participants, which was then placed in a disposable tube devoid of any materials and left to stand for a while. The blood is centrifuged for five minutes at 3000 rpm after ten minutes at room temperature.

### Assessment of liver enzyme by spectrophotometer

A spectrophotometer was used to assess the levels of AST, ALT, and ALP after obtaining the serum analysis kit (Standard Kits) from the French company Biolabo.

### Statistical analysis

The data was subjected to statistical analysis using IBM SPSS Version 22's t-test. At a significance level of p.value < 0.05, we compared the arithmetic means (mean) and standard error means of the sick and healthy samples.

## Result

The results of the study shown in Table 1 indicate that the infection rate with the *E. histolytica* was 61.1% microscopically out of a total of 90 samples, and the samples that gave a negative result for the presence of the parasite was 38.9%.

**Table 1.** Percentage of samples tested for *E. histolytica*

Examined samples	Positive result	Percentage	Negative result	Percentage
90	55	61.1%	25	38.9%

The results of the current study showed that infection with the parasite in males reached 59.1%, while in females it was 63%, as shown in Table 2.

**Table 2.** Percentage of samples positive for *E. histolytica* according to sex

Sex	Examined samples	Positive result	Percentage
Male	44	26	%59.1
Female	46	29	%63
Total	90	55	61.1%

The results of the study, indicate significant difference in ALT and AST level in patients infected with *E. histolytica* ( $33.18 \pm 5.03$ ,  $37.50 \pm 5.32$ ) as compared with control at a p-value < 0.05. While non-significant differences in ALP in patients infected with *E. histolytica* as compared with control at a p-value > 0.05

**Table 3.** Liver enzyme levels in patients with *E. histolytica*

Parameters	Patients with <i>E. histolytica</i>	Control	P-Value
AST	33.18 ± 5.03	24.90 ± 3.64	0.04
ALT	37.50 ± 5.32	22.72 ± 4.69	0.017
ALP	88.5 ± 9.4	89.8 ± 9.7	0.563

## Discussion

Subsequent to exposure, *E. histolytica* colonizes the large intestine, resulting in intestinal amebiasis. In roughly 1% of instances, trophozoites compromise the intestinal mucosa and disseminate to other organs, resulting in diverse manifestations of extraintestinal amebiasis, with amebic liver abscess being the most prevalent [9]-[11].

The results of the current study are consistent with [12] reported, which was 60% in Salah al-Din, and also gave a result similar to [13] reported, which was 61.93%. This result differed from [14], [15] regarding the lowest rate of infection with *E. histolytica* by microscopic examination, which was 33 (8.3%) and 13 (4.28%) respectively. This variation may be ascribed to disparities in sanitation standards, personal cleanliness, population density, lifestyle, and climate circumstances conducive to the prolonged survival of cysts, hence elevating the probability of infection.

The study's findings aligned with [16], which indicated no disparity in infection rates between males and females. The findings were consistent with [17], which reported comparable rates between males and females (49.6% vs. 50.4%). Nevertheless, the findings contrasted with those of [18], who documented a higher prevalence in females than in males and ascribed the disparity in infection rates between the sexes to various variables. Biological causes are likely accountable for this diversity, as physiological differences may influence individuals' vulnerability to infection or their immunity against it. The results were inconsistent with [19], which reported a greater infection rate in males (58.3%) than in females (41.6%). The disparity in incidence rates between males and females can be ascribed to behavioral, immunological, and hormonal distinctions, since androgens induce a pronounced elevation in the recruitment of white blood cells in males, hence augmenting the risk of immune illnesses [20].

This study assessed the effect of *E. histolytica* infection on liver function in patients from Tikrit city. Our data demonstrate that infection is linked to substantial changes in hepatocellular enzymes as increase AST, ALT, and ALP with infected children with *E. histolytica*. This result agree with [21].

AST elevation corroborates hepatocellular injury and supports the presence of liver tissue disruption. While AST is less liver-specific than ALT, concurrent elevations strengthen the evidence for hepatic involvement, consistent with prior studies of

amebic liver abscess [22], [23]. ALT serves as a sensitive indicator of hepatocellular injury, mirroring the cytopathic effects of trophozoites in liver tissue, in accordance with prior studies on amebic liver disease [24]. These data indicate that ALT elevation may act as an early marker of hepatic involvement in infected patients. In experimental study on rat [25], showed increase ALT, AST, ALP in infected rats with *E. histolytica*. The present study agree with [26], that showed increase ALT, AST in infected patients with *E. histolytica*

## Conclusion

*E. histolytica* infection in patients correlates with substantial increases in ALT and AST, signifying liver damage and potential biliary involvement. Conversely, ALP remains mainly unaltered. Monitoring liver function indicators can yield early indications of hepatic involvement, facilitating prompt diagnosis and management of amebiasis in endemic regions.

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