

The Hematological and Biochemical Effect of the Gastrointestinal *Entamoeba histolytica* in District Meerut (U. P.)

Praveen Kumar*

Department of Zoology, D.N. College, Meerut (U. P.), India

Abstract

Entamoeba histolytica represent one of the leading causes of parasitic diseases. Invasive Amoebiasis caused by *Entamoeba histolytica* is a global health problem. In the present study a survey was carried out from urban and rural population of Meerut District. For this present study the samples of stool were collected. The collected stool specimens were examined microscopically for the presence of eggs, cysts and trophozoites of intestinal parasites, using direct saline smear and concentration method for the confirmation of parasitic positive patients. The persons having any cysts/ova/trophozoites/whole parasite were treated as parasitic positive. Parasitic positive patients were subjected for hematological and biochemical examination. T-Square test was applied for analyzing the data. This study would also helpful in the designing antiparasitic agents in the terms of malnourished patients with single of concurrent infections and fulfilling the national needs and human health hazards which are the most urgent and serious problem to tackled at the present-day conditions.

Keywords: Amoebiasis; Hematology; Parasitic infection; *Entamoeba*

Introduction

Human infection with the protozoan intestinal parasite *Entamoeba histolytica* which causes Amoebiasis usually begins with ingestion of the dormant form of the organism [1]. *Entamoeba histolytica* spreads by the fecal-oral route mainly in areas where water sanitation is poor [2]. Amoebiasis is a parasitic disease caused by *Entamoeba histolytica* (*E. histolytica*), an extracellular enteric protozoan. This infection mainly affects people from developing countries with limited hygiene conditions, where it is endemic. Infective cysts are transmitted by the fecal-oral route, excysting in the terminal ileum and producing invasive trophozoites (amoebae). *E. histolytica* mainly lives in the large intestine without causing symptoms; however, possibly as a result of so far unknown signals, the amoebae invade the mucosa and epithelium causing intestinal amoebiasis. *E. histolytica* possesses different mechanisms of pathogenicity for the adherence to the intestinal epithelium and for degrading extracellular matrix proteins, producing tissue lesions that progress to abscesses and a host acute inflammatory response. Much information has been obtained regarding the virulence factors, metabolism, mechanisms of pathogenicity, and the host immune response against this parasite; in addition, alternative treatments to metronidazole are continually emerging. An accessible and low-cost diagnostic method that can distinguish *E. histolytica* from the most nonpathogenic amoebae and an effective vaccine are necessary for protecting against amoebiasis. However, research about the disease and its prevention has been a challenge due to the relationship between *E. histolytica* and the host during the distinct stages of the disease is multifaceted. Intestinal parasites are endemic worldwide and have been described as constituting the greatest single worldwide cause of illness and disease. The effective prevention and control of intestinal parasitic infections requires identification of local risk factors, particularly among high-risk groups. Intestinal parasites are worms and other intestinal parasites, which infest human beings that populate the gastrointestinal tract. Children are more often infected with intestinal worms than adult. In humans, they are often spread by poor hygiene related to feces, contact with animals or poorly cooked food containing parasites. Intestinal parasitic infection affects 3.5 billion people in the world and mostly affecting the low socio-economic groups. The major groups of parasites can get into the intestine through the mouth and they move into the intestine where they can reproduce and cause disease. Health

component depends upon socio-economic status, housing, hygiene i.e. Water supply, food hygiene, environmental hygiene and personal hygiene sanitation and education. A parasite is an organism, which feeds off and usually within a host body, such as our body or other living organism like plant and animals. They feed on the nutrient cells, blood and organs of the host. They reproduce by depositing thousands of eggs or simply by cells division within the host tissues and cells. Amoebiasis is a common infection of human gastrointestinal tract. It has been reported throughout India. The prevalence rate is about 15 percent ranging from 3.6 to 47.4 percent in different areas. Although it has worldwide distribution, it is a major problem in whole China, South East and West Asia, Latin America and Mexico. And it is estimated in 1997, 45 million people carried *E. histolytica* in their intestinal tract invasive amoebiasis. It is probable that invasive amoebiasis accounted for about 70000 deaths in the world [3]. Epidemiological studies on the prevalence of *Entamoeba histolytica* infection indicate that over 480 million people in the world harbor the parasite and every year about 10% of those infected show some short of clinical symptoms (dysentery, intestinal invasion) [4]. *Entamoeba histolytica* also causes extra intestinal diseases such as liver abscesses [5,6]. Amoebiasis is a disease of global importance caused by the eukaryotic parasite *Entamoeba histolytica*. It is the most common worldwide cause of mortality from protozoan after malaria, killing and estimated 40000-110000 people annually and causing 34-50 million cases of severe diseases. However, fewer than 10% of those infected develop invasive amoebiasis.

***Corresponding author:** Dr. Praveen Kumar, Department of Zoology, D.N. College, Meerut (U. P.), India, Email: drpks75@gmail.com

Received: 01-Nov-2023, Manuscript No ECR-23-118855; **Editor assigned:** 04-Nov-2023, PreQC No. ECR-23-118855(PQ); **Reviewed:** 18-Nov-2023, QC No. ECR-23-118855; **Revised:** 25-Nov-2023, Manuscript No. ECR-23-118855(R); **Published:** 30-Nov-2023, DOI: 10.4172/2161-1165.1000518

Citation: Kumar P (2023) The Hematological and Biochemical Effect of the Gastrointestinal *Entamoeba histolytica* in District Meerut (U. P.). Epidemiol Sci, 13: 518.

Copyright: © 2023 Kumar P. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Material and Methods

The Present study was carried out on human intestinal parasitic patients and few healthy subjects as control. A survey was carried out for human parasitic diseases. In the present study there were total numbers of 451 samples of stool collected for microscopic investigations. The Simple Smear in Saline and concentration methods was used to determine the stool samples. The persons having any cyst /ova / trophozoite / whole parasite were treated as parasitic positive patients. In this study hematological and biochemical effect of the gastrointestinal *Entamoeba histolytica* on human populations were observed. Blood samples were collected from intestinal parasitic positive patients and few healthy subjects as control from both populations for microscopic studies of samples. In the microscopic investigations hematological and biochemical investigations were examined for hematological findings (Hb, RBC, TLC, DLC, ESR, PCV, MCV, MCH and MCHC) and biochemical findings (Serum Total Protein, Serum Total Albumin, Serum Total Globulin, Serum Iron, Serum Binding Capacity, Serum Glucose and Serum Lipids) were applied during these studies. The t-Squared tests were performed.

Results and Discussion

Hematological findings

The mean level of Hemoglobin (Hb) in the patients of amoebiasis was observed as $10.4 \pm 0.067^*$ gm/dl. It was significantly higher as compared to control, Red Blood Cells (RBCs) $3.5 \pm 0.031^*$ million/cumm. It was significantly higher than to control, Total Leucocytes Count (TLC) $8560 \pm 45.73 \text{ mm}^3$. It was lower than control. The mean level of erythrocyte sedimentation rate (ESR) was observed as $04 \pm 0.709 \text{ mm in 1}^{st} \text{ hr}$. Packed cell volume (PCV) was $30.6 \pm 0.245^*$ percent. It was more significantly higher as compared to control, mean corpuscular volume (MCV) was observed as $87.4 \pm 0.619^*$ cubic micron and it was significantly higher as compared to control. The mean level corpuscular haemoglobin (MCH) was observed as 30 ± 0.213 picograms. Mean corpuscular concentration (MCHC) was 33.8 ± 0.178 percent. The mean level of differential counts (DLC) were observed in Polymorphs (P) $55 \pm 1.58^*$ percent it was more significant, in Lymphocytes (L) 33 ± 1.34 percent, in Eosinophils (E) $8.4 \pm 0.70^*$ percent was more significant, in Monocytes (M) 2.8 ± 0.375 percent and in Basophils (B) was observed as 0.4 ± 0.24 percent (Table 1 and Figures 1-3).

Table 1: Hematological findings in the patients of Amoebiasis.

Parameter (Unit)	Control	Amoebiasis
Hb (gm/dl)	14.42 ± 0.185	$10.4 \pm 0.067^*$
RBC (million/cumm)	4.78 ± 0.058	$3.5 \pm 0.031^*$
TLC (mm ³)	8570 ± 48.29	8560 ± 45.73
ESR (mm in 1 st hr)	3.2 ± 0.375	04 ± 0.709
PCV (%)	42.8 ± 0.58	$30.6 \pm 0.245^*$
MCV (cubic micron)	89.4 ± 0.134	$87.4 \pm 0.619^*$
MCH (picograms)	30.2 ± 0.0776	30 ± 0.213
MCHC (%)	33.7 ± 0.086	33.8 ± 0.178
DLC (%)	P (%)	61 ± 1.0
	L (%)	32.2 ± 1.34
	E (%)	2.6 ± 0.40
	M (%)	03 ± 0.44
	B (%)	0.2 ± 0.20

Values express as mean \pm SE (n=5).

*Value significantly different from control.

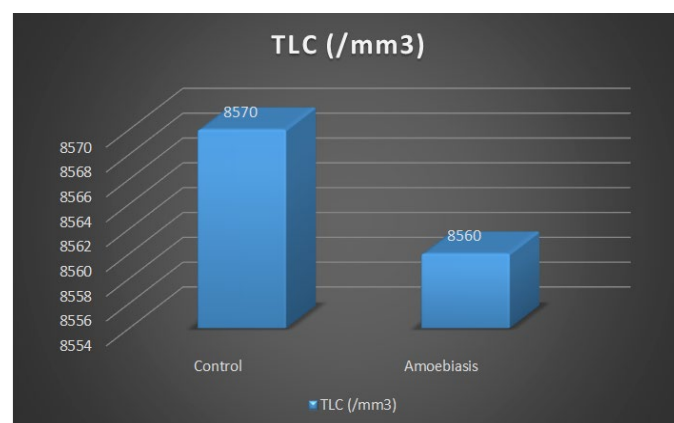


Figure 1: Haematological studies showing the status of TLC in the patients of Amoebiasis.

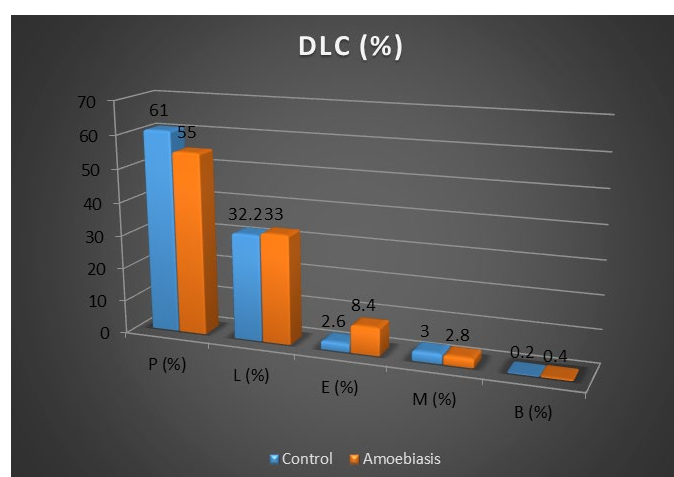


Figure 2: Haematological studies showing the status of DLC in the patients of Amoebiasis.

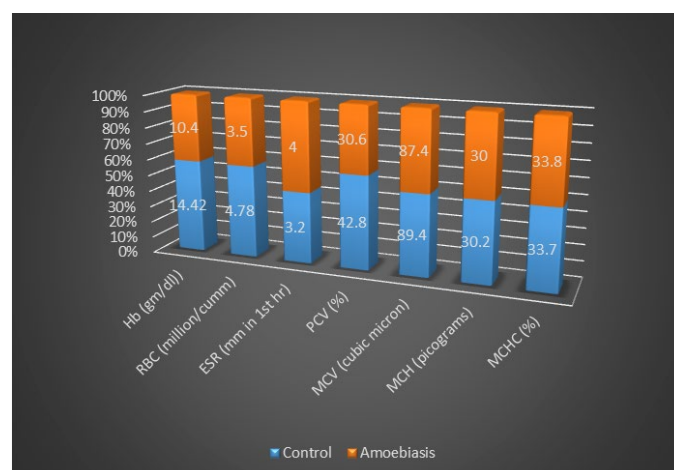


Figure 3: Haematological studies showing the status of Hb, RBC, ESR, PCV, MCV, MCH and MCHC in the patients of Amoebiasis.

Biochemical findings

The mean level of Serum total protein (STP) was observed in the patients of amoebiasis as $6.5 \pm 0.1 \text{ gm/dl}$, Serum albumin (S. A) was $3.7 \pm 0.0865 \text{ gm/dl}$, Serum globulin (S. G) was observed as $2.8 \pm 0.164 \text{ gm/dl}$, Serum Iron (S I) mean level was $76.8 \pm 1.160^* \mu\text{g/dl}$ it was more than higher significant as compared to control, Serum iron binding capacity

(SIBC) mean level was observed as 322 ± 3.48 $\mu\text{g/dl}$, and the mean level of serum of glucose (S G) was observed as 100.2 ± 2.60 mg/dl and the mean level of serum lipids was observed in the patients as $600.4 \pm 6.40^*$ mg/dl it was more significant as compared to control. It was decreased as compared to control group (Table 2, Figures 4 and 5).

It is revealed that the high prevalence of intestinal helminthes shown in the low socio-economic group. [7-14]. It is observed that the intestinal parasitic were found to be 45.5% on stool examination of 1022 children below 15 years of age resting in Udipur City. Amoebiasis topped the list (16.4%) followed by enterobius 10.8%, Giardia lamblia 9.5%, Entamoeba coli 2.8%, Hymenolopsisnana 2.7%, Trichuria trichuris 0.5% and Ancylostoma deudnale 0.3% [15]. The elevation in the count of eosinophils in the patients of amoebiasis and also described that intestinal amoebiasis shows moderate leukocytosis

Table 2: Biochemical findings in the patients of Amoebiasis.

Parameter (Unit)	Control	Amoebiasis
Serum Total Protein (gm/dl)	7.06 ± 0.075	6.6 ± 0.130
S. Albumin (gm/dl)	4.08 ± 0.058	3.96 ± 0.143
S. Globulin (gm/dl)	2.98 ± 0.116	2.64 ± 0.125
S. Iron ($\mu\text{g/dl}$)	85.6 ± 1.54	83.2 ± 0.862
S. Iron binding capacity ($\mu\text{g/dl}$)	326.4 ± 4.65	$321.4 \pm 2.29^*$
S. Glucose (mg/dl)	102 ± 1.27	102.4 ± 4.68
S. Lipids (mg/dl)	630 ± 6.34	$385.4 \pm 14.29^*$

Values express as mean \pm SE (n=5).

*Value significantly different from control.

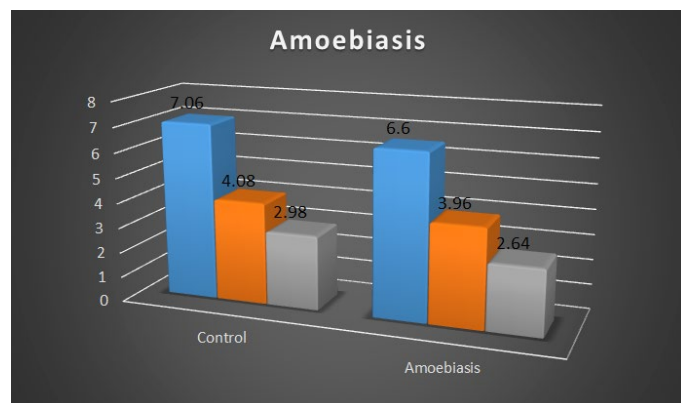


Figure 4: Biochemical studies showing the status of STP, S. Albumin, S. Globulin in the patients of Amoebiasis.

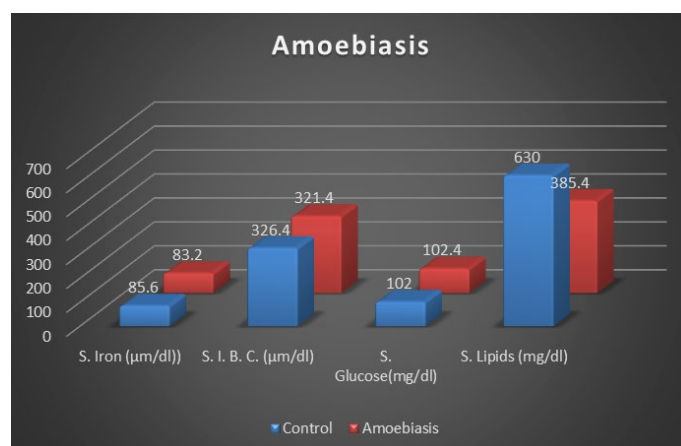


Figure 5: Biochemical studies showing the status of STP, S. Albumin, S. Globulin in the patients of Amoebiasis.

[16]. The relationship between socio-economic status and child mortality has been well documented [17-21]. *Entamoeba histolytica* is a protozoan that causes intestinal amoebiasis as well as extra intestinal manifestations. Although 90 percent of *E. histolytica* infections are asymptomatic, nearly 50 million people become symptomatic, with about 100,000 deaths yearly. Amebic infections are more prevalent in countries with lower socioeconomic conditions. *Entamoeba histolytica* is the third-leading cause of parasitic mortality globally [22]. *E. histolytica* infection generally does not cause symptoms, but the parasite has potent pathogenic potential. The origins, benefits, and triggers of amoebic virulence are complex. Amoebic pathogenesis entails depletion of the host mucosal barrier, adherence to the colonic lumen, cytotoxicity, and invasion of the colonic epithelium. Parasite damage results in colitis and, in some cases, disseminated disease. Both host and parasite genotypes influence the development of disease, as do the regulatory responses they govern at the host-pathogen interface. Host environmental factors determine parasite transmission and shape the colonic microenvironment *E. histolytica* infects [23].

Conclusion

The present study is fulfilling the national needs and human health hazards which are the most urgent and serious problem to tackled at the present day conditions. This study provides the influence of unhygienic condition of the continuity of human intestinal parasitic infections in rural and urban population. The prevalence of gastrointestinal parasitic diseases in rural and urban population appears to be high due to poverty, low literacy status, standards of living, social norms, customs and open defecation habits. The present study would also helpful in the designing antiparasitic agents in the terms of malnourished patients with single of concurrent infections.

References

- Mattern CFT, DB Keister, Natoviz (1982) Virulence of *Entamoeba histolytica* upon continuous axenic cultivation. Arch Invest Med (Mex) 13: 185-190.
- Haque R, Huston CD, Hughes M, Houpt E, Petri WA (2003) Amoebiasis. N Engl J Med 348: 1565-1573.
- WHO (1998) The world health report of 1998, Life in the 21st century, A vision for all, Report of Director General WHO.
- Walsh JA (1986) Problems in recombination and diagnosis of amoebiasis: estimation of the global magnitude of morbidity and mortality. Rev Infect Dis 8: 228-238.
- Haque R, Kabir M, Noor Z, Rehman SM, Mondal D (2010) Diagnosis of amoebic liver abscess and amoebiotic colitis by detection of *E. histolytica* DNA in blood, urine and saliva by a real time PCR assay. J Clin Micro 48: 2798-2801.
- Haque R, Mondal D, Duggal P, Kabir M, Roy S (2006) *E. histolytica* infection in children and protection from subsequent amoebiasis. Infection and Immunity 74: 904-909.
- Kumar P, Rajesh P, Lata S (2013) An Epidemiological Profile of human gastrointestinal parasites in Meerut District. Bulletin of Environment, Pharmacology and Life Sciences (BEPLS) 3: 228-231.
- Kumar P, Rajesh P (2015) Prevalence of Intestinal Parasitic Infections in Meerut District. International Archive of Applied Sciences and Technology IAAST 6: 40-43.
- Kumar P, Rajesh P (2017) An Epidemiological Survey on Intestinal Parasitic Infestation among Urban and Rural Population of Meerut (U.P.). World Journal of Pharmaceutical Research (WJPR) 6: 1207-1214.
- Kumar P (2018) A Study of Prevalence of Intestinal Parasites and Associated Risk Factors among Urban and Rural Population of Khurja (Bulandshahr). WJPR 7: 839-846.
- Kumar P (2018) Intestinal Parasitic Infection and Nutritional Status among Urban and Rural Population of Khurja, Bulandshahr. JETIR 7: 71-77.
- Kumar P (2018) Prevalence of Malnutrition and Associated risk Factors among Urban and Rural Population of Meerut. WJPR 7: 847-855.

13. Kumar P (2021) Intestinal Parasitism and Related Risk Factors in the Vicinity of Khurja, Bulandshahr, (U.P.). IJCRT, 9: 1866-1873.
14. Kumar P, Singh R B (2022) Epidemiology of Intestinal Parasitosis in Meerut District (U.P.). IJERMDC 9: 1.
15. Bhandari B, Gupta GP, Mondowara SL (1985) Prevalence of intestinal parasites in Udipur. Ind Jour Ped 52: 299.
16. Chatterjee KD (1996) Parasitology (Protozoology and Helminthology) in Relation to Clinical Medicine. Tweleth Edition.
17. Faarah AZ, Preston SH (1982) Child mortality differentials in Sudan. Pop and Dev Rev 8: 365-383.
18. D' Souza A, Bhuiya A (1982) Socio-economic mortality differentials in rural area of Bangladesh. Pop and Dev Rev 8: 753-769.
19. Da Vanza J (1983) A household survey of child mortality determinants in Malaysia Workshop on child survival strategies for research, Italy.
20. Majumdar AK, Islam SMS (1993) Socio-economic and environmental determinants of child survival in Bangladesh. J Biosoc Sci 25: 311-318.
21. Spencer N (1996) Poverty and child health, Oxford. U.K. and New York. NY: Radeliff Medical Press 74-94.
22. Arthue Chou, Richard L, Austin Jun (2022) A Book: Amoebiasis. Star Prarls (Internet) Treasure Island (FL): Stat Pearls Publishing.
23. Chelsea Marine, William A (2014) Regulation of virulence of *Entamoeba histolytica*. Petri Jr 68: 493-520.