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PREVALENCE OF ENTAMOEBA HISTOLYTICA IN STOOL SPECIMENS AT MUHONDO HEALTH CENTER, RWANDA

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ABSTRACT

Entamoeba histolytica is a protozoan parasite causing amebiasis. It occurs usually in the large intestine and causes internal inflammation as its name means (histo = tissue, lytic = destroying). Between 40 and 50 million people are infected worldwide, mostly in tropical countries, in areas of poor sanitation. The infection occurs by ingestion of mature cyst in fecally contaminated food, water or hands. The disease shows different symptoms including vomiting, abdominal pain, nausea, watery and bloody diarrhea. While the infection becomes extra-intestinal, it may cause abscess in other organs such as liver, kidney, brain and lungs.

The present study was carried out to determine the prevalence of *E. histolytica* in stool specimens at Muhondo Health Center. A total of 103 fecal specimens were collected over a period of three months. Out of 103 specimens, only 26 (25.2%) were positive for *E. histolytica*. Out of the 26 specimens positive for *E. histolytica*, 17 (16.5%) and 9 (8.7%) were from males and females respectively. Furthermore, of the 26 Specimens positive for *E. histolytica*, 15 (14.6%) and 11 (10.7%) were from people ≤ 15 and >15 years of age respectively. *Entamoeba histolytica* was more prevalent 26 (25.2%) than other parasites including *Giardia* with 15 (14.6%), *Ascaris sp* with 5 (4.9%), *Trichomonas intestinalis* with 16 (15.5%) and *Entamoeba coli* with 1 (1%). In order to reduce *Entamoeba histolytica* contamination and infections, the following recommendations were pointed out: (i) improving personal hygiene (washing hand before eating and after using latrines); (ii) avoiding fecal contamination of food, water, and utensils; and (iii) boiling drinking water before consumption.

Key words: Parasites, Prevalence, *Entamoeba histolytica*, amebiasis, Stool specimens, Muhondo Health Center.

PREVALENCE D'ENTAMOEBA HISTOLYTICA DANS LES ECHANTILLONS DE SELLES AU CENTRE DE SANTE DE MUHONDO

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Résumé

Entamoeba histolytica est un parasite protozoaire provoquant l'amibiase. Il se produit généralement dans le gros intestin et provoque une inflammation interne comme son nom le signifie (histo = tissu, lytica = destruction). Entre 40 et 50 millions de personnes sont infectées dans le monde, principalement dans les pays tropicaux, dans les zones de mauvaises conditions d'hygiène.

L'infection se produit par ingestion de kyste mature dans des aliments, l'eau ou les mains contaminés par des matières fécales. La maladie montre différents symptômes, notamment du vomissement, des douleurs abdominales, de la nausée, une diarrhée aqueuse et sanglante. Quand l'infection devient extra-intestinale, elle peut provoquer des abcès dans d'autres organes tels que le foie, les reins, le cerveau et les poumons.

La présente étude a été réalisée afin de déterminer la prévalence d'*E. histolytica* dans les échantillons de selles au Centre de Santé de Muhondo. Un total de 103 échantillons de selles ont été recueillis sur une période de trois mois. Au cours de l'étude, sur 103 échantillons, seulement 26 (25,2%) étaient positifs pour *E. histolytica*. Sur les 26 échantillons positifs pour *E. histolytica*, 17 (16,5%) et 9 (8,7%) venaient des mâles et les femelles respectivement. En outre, de ces 26 échantillons positifs pour *E. histolytica*, 15 (14,6%) et 11 (10,7%) venaient des gens de ≤ 15 ans et de >15 ans respectivement.

E. histolytica était plus fréquent 26 (25,2%) que les autres parasites, y compris *Giardia* avec 15 (14,6%) , *Ascaris sp* avec 5 (4,9%), *Trichomonas intestinalis* avec 16 (15,5%) et *Entamoeba coli* avec 1 (1 %) .

Afin de réduire la contamination et les infections d'*Entamoeba histolytica*, les recommandations suivantes ont été mentionnées : (i) améliorer l'hygiène personnelle (lavage des mains avant de manger et après avoir utilisé les latrines), (ii) éviter la contamination des aliments, de l'eau et des ustensiles avec des matières fécales, et (iii) faire bouillir l'eau potable avant la consommation .

Mot Clés: Parasites, Prevalence, *Entamoeba histolytica*, amibiase, les échantillons de selles, Centre de Santé de Muhondo.

INTRODUCTION

Entamoeba histolytica is an eukaryotic, anaerobic, parasitic protozoan that is a member of the genus *Entamoeba*. *Entamoeba histolytica* may lead to amebic dysentery, illness characterized by fulminating dysentery, diarrhea, weight loss, fatigue, abdominal pain, vomiting and amebomas (1). *Amebiasis* ranks third among parasitic diseases leading to death Worldwide and it is second to malaria as a protozoan cause of death (2).

It is distributed worldwide and poses an especially serious health threat in tropical and subtropical developing areas and it is also a problem in the developed world in travelers, immigrants, and men who have sex with men (3). Worldwide intestinal amebiasis is frequent, with approximately 500,000,000 persons infected every year (4, 5).

Entamoeba histolytica may live as cysts and trophozoites. Cysts are typically found in formed stool whereas trophozoites are typically found in diarrheal stool. Infection by *Entamoeba histolytica* occurs by ingestion of mature cysts in fecally contaminated food, water, or hands. Excystation occurs in the small intestine and trophozoites are released, which migrate to the large intestine (3).

Trophozoites passed in the stool are rapidly destroyed once outside the body, and if ingested would not survive exposure to the gastric environment. In many cases, the trophozoites remain confined to the intestinal lumen of individuals who are asymptomatic carriers, passing cyst in their stool (6). Both trophozoites and cysts are found in the intestinal lumen, but only trophozoites invade tissue. In animals, depletion of intestinal mucus, diffuse inflammation, and disruption of the epithelial barrier occur before trophozoites actually come into contact with the colonic mucosa. Trophozoites attach to colonic mucus and epithelial cells by a galactose-inhibitable lectin (7).

Transmission occurs via the fecal-oral route, either directly by person-to-person contact (such as by diaper-changing or sexual practices) or indirectly by eating or drinking fecally contaminated food or water (8). The major objective of this study was the determination of the prevalence of *Entamoeba histolytica* in stool specimens at Muhondo Health Center.

MATERIALS AND METHODS

A total of 103 non-duplicate stool specimens were collected at Muhondo Health Center located in Northern Province (Gakenke district) over a period of three months (1st of May to 31st July 2014). Stool specimens from patients with diarrhea or complaining of dull and persistent lower part abdominal pains were analyzed in laboratory department of Muhondo Health Center. The informed consent of the experimental subjects and the approval of the appropriate ethical committee had been obtained.

A wide mouth screw-capped container pre-labeled with the individual's code, sex, and age was distributed to each patient for collection of a fecal sample. The people enrolled for this study were examined for the presence of common intestinal parasites by microscopy based on characteristics of *E. histolytica*.

Stool specimens were taken from each person and processed the same day with direct smears (saline and iodine), and examinations by concentration (flotation) with zinc sulfate were prepared from each sample and examined microscopically at low (20x) and high (40x) magnifications. These examinations were carried out in accordance with NCCLS recommendations (9).

The identification of *E. histolytica* trophozoites was made by the characteristic movement of the protozoan and the presence of phagocytized red blood cells (10). Trophozoites were more frequently observed in fresh stool specimens that contain mucus, pus, and trace amounts of blood (11). The identification of amebic cysts of *E. histolytica* and other commensal and pathogenic parasites was based on morphologic characteristics (12).

The data were presented in form of tables and complimented with graphs and chart and analyzed using Microsoft Office (word and Excel) to get the trend of *E. histolytica* during the study period.

RESULTS

The patients were classified in two age groups (≤ 15 years and >15 years). The study showed that 53 (51.5%) people were > 15 years while 50 (48.5%) were ≤ 15 years (Table 1). Patients were also classified

based on gender. Results showed that 52 (50.5%) and 51(49.5 %) patients were male and female respectively (Table 2).

The majority of examined specimens (103) were negative for *entamoeba histolytica* because 77 (74.8%) and 26 (25.2%) specimens were negative and positive respectively (Table 3).

TABLE 1: STUDY PARTICIPANTS ACCORDING TO AGE GROUP

Age	Frequency	Percentage (%)
≤ 15 years	50	48.5
> 15 years	53	51.5
Total	103	100

TABLE 2: STUDY PARTICIPANTS ACCORDING TO GENDER

Gender	Frequency	Percentage (%)
Male	52	50.5
Female	51	49.5
Total	103	100

TABLE 3: PREVALENCE OF ENTAMOEBIA HISTOLYTICA IN STOOL SPECIMENS

Results	Frequency	Percentage (%)
Positive to <i>E.histolytica</i> .	26	25.2
Negative to <i>E.histolytica</i>	77	74.8
Total	103	100

The study also checked the prevalence of *Entamoeba histolytica* compared to other common parasites. Results showed that *Entamoeba histolytica* was more prevalent 26 (25.2%) than other parasites including *Giardia* with 15 (14.6%), *Ascaris sp* with 5 (4.9%), *Trichomonas intestinalis* with 16 (15.5%) and *Entamoeba coli* with 1 (1%) (Table 4).

TABLE 4: PREVALENCE OF E. HISTOLYTICA COMPARED TO OTHER PARASITES

Parasites	Frequency	Percentage (%)
<i>Entamoeba histolytica</i>	26	25.2
<i>Giardia lamblia</i>	15	14.6
<i>Ascaris sp</i>	5	4.9
<i>Trichomonas intestinalis</i>	16	15.5
<i>Entamoeba coli</i>	1	1
Other parasites (yeast, <i>Trichuris</i> , <i>Taenia</i> eggs)	8	7.8
Negative cases	32	31
Total	103	100

Our main objective which was the determination of the prevalence of *E.histolytica* among the people attending MUHONDO Health Center was achieved. This study showed that people ≤ 15 years of age are more affected by *E. hystolytica* than people above 15 years. Lastly, *E. hystolytica* was prevailing at Muhondo Health Center along with other parasites (*Giardia*, *Ascaris*, *Trichomonas*, and *E. coli*).

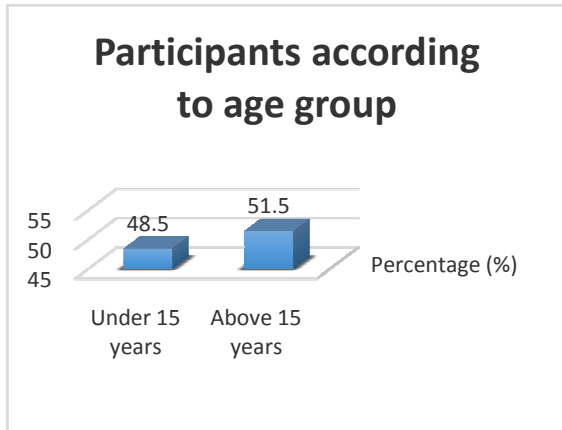


Figure1: Study participants according to age group

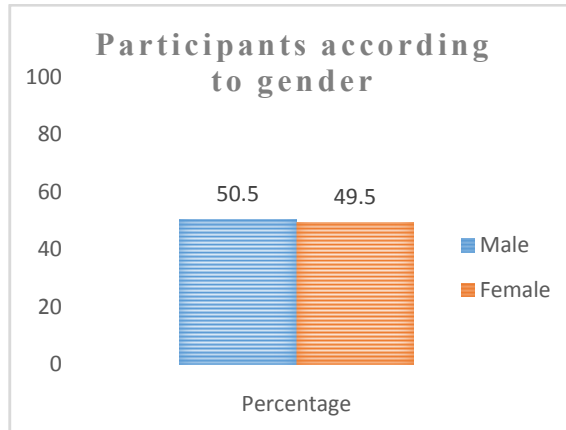


Figure 1: Study participants according to gender

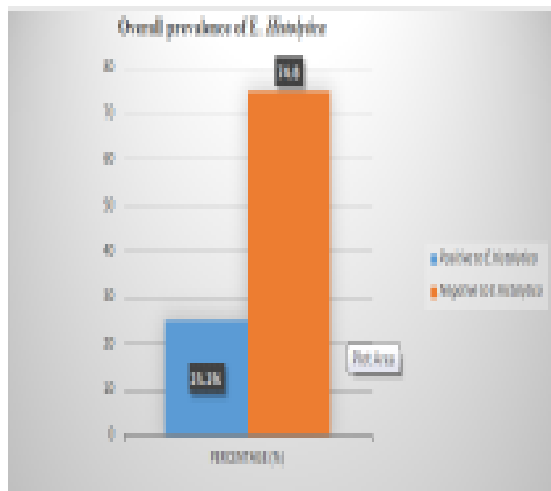


Figure 2: The overall prevalence of *Entamoeba histolytica* in stool specimens

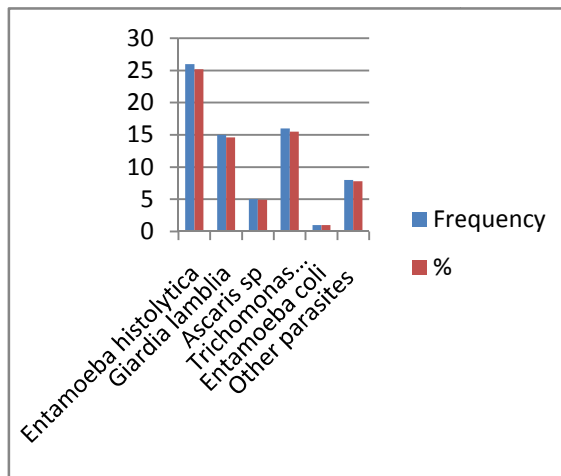


Figure 4. Prevalence of *E. histolytica* compared to other parasites

DISCUSSION

The study showed that *Entamoeba histolytica* was prevalent in 26 (25.2%) patients. This suggests that people around Muhondo Health center are exposed to fecally contaminated food and water which concurs with the study of Lupi *et al*, 2009 stating that transmission occurs via the fecal-oral route, either directly by person-to-person contact or indirectly by eating or drinking fecally contaminated food or water (7).

The results revealed that the majority of people affected by *E. histolytica* are in the age group ≤ 15 years. This is in agreement with study carried out by Brown *et al*, 1991 where *E. histolytica* had 30.82% in people ≤ 15 years of age and 17.34% in age group of 31 to 45 years (13). According to Cook *et al*. (2009),

there is positive correlation between increased rates of *E. histolytica* infection with young age, wet season, female gender, and severe malnutrition (14).

The study results showed that men are more affected by *E. histolytica* (16.5%) than women (8.7%). This concurs with the studies of Haque *et al*, 2006 and Brown *et al*, 1991 which showed that the infection of *E. histolytica* was more prevalent in male hosts (22.36%) as compared to female ones (20.9%) (13).

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REFERENCES

1. Sebastiaan J.V., Stark D.J., Fotedar R., Marriott D., John T., Ellis J.T., and Harkness J.L.. Amebiasis: current status in Australia. *M. J. A.* 2007; 186: 412-416.
2. Schmidt, G.D., Roberts, L.S. Foundations of Parasitology, 6th Ed. New York: Mc Graw-Hill Companies; 2000: 767
3. Haque R., Mondal D., Duggal P., Kabir M., Roy S., Farr B.M., Sack R.B., and Petri W.A. Jr. *Entamoeba histolytica* infection in children and protection from subsequent amebiasis. *Inf. Immun.* 2006; 74: 904-909.
4. Walsh J.A. Problems in recognition and diagnosis of amebiasis: estimation of the global magnitude of morbidity and mortality. *Rev Inf Dis* 1986; 8: 228-38.
5. Espinosa M., Martinez-Palomo A. Pathogenesis of intestinal amebiasis: from molecules to disease. *Clin Microbiol Rew* 2000; 13: 318-31.
6. Ryan, K.J., Ray, C.G. Sherris Medical Microbiology, An Introduction to infectious diseases. McGraw-Hill Medical Publishing Division, New York, 2004; 4:261-270.
7. Seydel K.B., Stanley S.L. Jr. *Entamoeba histolytica* induces host cell death in amebic liver abscess by a non-Fas-dependent, non-tumor necrosis factor alpha-dependent pathway of apoptosis. *Infect Immun.* 1998.
8. Lupi O., Bartlett B.L., Haugen R.N., Dy L.C., Sethi A., Klaus S.N., Machado P.J., Bravo F., Tying S.K. Tropical dermatology: Tropical diseases caused by protozoa. *J Am Acad Dermatol.* 2009.
9. National Committee on Clinical Laboratory Standards (NCCLS). Procedures for the recovery and identification of parasites from the intestinal tract. Approved guideline. Pennsylvania. 1997.
10. Garcia, L.S., Bruckner, D.A. Diagnostic medical parasitology, 3rd ed. ASM Press, Washington, D.C. 1997.
11. Proctor, E. M. Laboratory diagnosis of amebiasis. *Clin. Lab. Med.* 1991; 11:829-859.
12. Garcia S.L., Bruckner A.D. Intestinal Protozoa: Ameba. In: American Society for Microbiology, editors. Diagnostic Medical Parasitology. 2nd ed. Washington, D.C. 1993; 6-17.
13. Brown M., Reed S., Levy J.A., Busch M., McKerrow J.H. *Entamoeba histolytica* transmission human to human. 1991.
14. Cook, D.M. Swanson, R.C., Eggett, D.L., Booth, G.M. A Retrospective Analysis of Prevalence of Gastrointestinal Parasites among School Children in the Palajunoj Valley of Guatemala. *JHealth Popul Nutr.* 2009; 1:31-40.