Original Article

Pattern of Intestinal Parasites among Hospital Patients at Tripoli Central Hospital, Libya

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Abstract

Background and Aim: Diagnosis of intestinal parasites is confirmed by the recovery of protozoan trophozoites and cysts, helminthes eggs, and larvae in stool samples in the clinical parasitological laboratory. In this study, we look at the prevalence of intestinal parasitic infections (IPIs) in outpatient department and hospitalized patients from different age groups in Tripoli Central Hospital obtained from 2007 to 2009. **Materials and Methods:** We have used the traditional microscopic technique to diagnose IPIs in all received stool samples during the study period. **Results:** In total, 18,000 stool samples were examined and it was found that 15.7% of them had at least one parasite. The overall prevalence of intestinal protozoan parasites was as follows: *Entamoeba histolytica*/*Entamoeba dispar* 5.1%, *Entamoeba coli* 10%, *Giardia lamblia* 8.1%, and *Cryptosporidium parvum* 1%, while the prevalence of intestinal helminthic parasites in this study was as follows: *Enterobius vermicularis* 5%, *Ascaris lumbricoides* 0.5%, and *Strongyloides stercoralis* 0.01%. Other species of intestinal helminthes are not widely prevalent in Libya. We have found a high prevalence of intestinal parasites, especially the intestinal protozoan parasites. The nonpathogenic protozoan, *E. coli,* had the highest prevalence rate (10.0%). **Conclusion:** We conducted the stool sample testing by routine ova and parasite methods, and a concentration technique increases the validity of the estimates.

Keywords: Intestinal parasites, Libya, stool samples, traditional microscopic technique

Introduction

Intestinal parasitic infection (IPI) is a common cause for abdominal disease worldwide. The probability of infection depends on the nature of human behavior and human–environment interactions.

Examination of stool continues to be the most important tool for monitoring the prevalence of such infections.

The microscopic examination of a direct smear has several purposes: To assess the worm burden of a patient, to provide a quick diagnosis of a heavily infected specimen, to check organism motility, and to diagnose parasites that may be lost in concentration techniques.[1]

In addition, the fecal concentration technique has become a routine procedure as a part of the complete ova and parasite examination and allows the detection of small numbers of parasites that may be missed using only a direct wet smear.[2]

These techniques are also used as an indicator to begin therapy against parasitic and opportunistic infections.[3]

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In Libya, many studies on parasitic infections are conducted; most of the diagnostic laboratories often rely on direct smear.

This study attempts to assess and provide a general idea on the spread of intestinal parasitic infections in Tripoli using the concentration method and it was carried out between October 2007 and 2009.

Material and Methods

Study patients

In total, 18,000 samples of fresh stool collected from hospitalized patients and outpatient department (OPD) (aged 14–65 years), attending the OPD clinic in Tripoli Central Hospital (TCH) during October 2007–2009, were selected for this study. All samples were labeled with identification numbers

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and analyzed in medical laboratory department at TCH with the study procedures used in our medical laboratories.

Direct smear and fecal concentration technique

Microscopic examination of feces is essential for the recognition and identification of intestinal parasites. Direct wet mount examination should not be entirely excluded as the trophozoites are usually destroyed during the concentration procedure and therefore, microscopic examination of wet mounts should be performed, which is prepared by mixing a small amount of stool with a drop of 0.85% NaCl; this mixture will provide a uniform suspension under a 22 mm × 22 mm cover slip.

Due to the low density of the parasites in the feces, direct microscopy is useful for the observation of motile protozoan trophozoites, and the examination of cellular exudates is not recommended solely for the routine examination of suspected parasitic infections. It is essential to increase the probability of finding the parasites in fecal samples to allow for an accurate diagnosis.

Therefore, a concentration method is employed namely Ritchie formalin-ethyl acetate sedimentation concentration procedure, where ethyl acetate is used as an extractor of debris and fat from the feces and it leaves the parasites at the bottom of the suspension. Direct smear and concentration technique each of these methods are designed for a particular purpose and forms an integral part of the total examination of stool samples.[4-6]

Statistical analysis

Statistical analysis was carried out using Microsoft Excel for mean ± standard deviation calculation and graphing; comparison of the means of our results to those from other published sources was carried out using Student's *t*-test.

Results and Discussion

The most common intestinal protozoan parasites include *Entamoeba histolytica*/*Entamoeba dispar* 5.1%, *Entamoeba coli* 10%, *Giardia lamblia* 8.1%, and *Cryptosporidium parvum* 1%, the diseases caused by these intestinal protozoan parasites are known as giardiasis, amebiasis, and cryptosporidiosis, respectively, and they are associated with diarrhea.[6] Amebiasis is the third leading cause of death from parasitic diseases worldwide, with its greatest impact on the people of developing countries. The World Health Organization estimates that approximately fifty million people worldwide suffer from invasive amebic infection every year, resulting in 40,000–100,000 deaths annually.[7,8]

Jacobsen *et al*. looked at the prevalence of intestinal parasites in young Quichua children in the highland or rural Ecuador.[9] They have found a high prevalence of intestinal parasites, especially the intestinal protozoan parasites, which is consistent with the results of our study. In a study conducted in a cohort of Bangladeshi children, it was found that the prevalence of *E. histolytica* in diarrheal stool samples was 8%.[10]

The nonpathogenic protozoan, *E. coli,* had the highest prevalence rate of 10% in this study.

The percentage of *E. histolytica*/*E. dispar* in our study was 5.1%. Diagnosis of *E. histolytica* cannot be done any longer by microscopy, since this parasite is morphologically similar to the nonpathogenic parasite *E. dispar*. The precise diagnosis of protozoal intestinal infection by microscopy can be difficult for some parasites; for example, the pathogen *E. histolytica*/*E. dispar*. To understand the real prevalence of *E. histolytica*-associated infection, a molecular method must be used for its diagnosis.[11-13]

G. lamblia is the most prevalent parasitic cause of diarrhea in the developing world, and this infection is also very common in developed countries. In this study, the pathogenic G. lamblia had the highest prevalence rate at 8.1%.

The lowest prevalence of intestinal protozoan was shown by the infection with *C. parvum* 1% since classic microscopic examination is less sensitive, and modified acid-fast staining is required. Cryptosporidiosis is becoming most prevalent in both developed and developing countries among patients with AIDS and among children aged <5 years. Spread of this protozoan parasite in developing countries mostly occurs through fecal contamination as a result of poor sewage and poor quality of water.[14] Diagnosis of cryptosporidiosis is also best accomplished by the detection of *Cryptosporidium* spp. antigen in stool samples,[15] since classic microscopic examination is less sensitive, and modified acid-fast staining is required. Polymerase chain reaction (PCR)-based test is required for the differentiation of these two species of *Cryptosporidium* spp.[16,17]

The prevalence of intestinal helminthic parasites in this study was as follows: *Enterobius vermicularis* 5.0%, *Ascaris lumbricoides* 0.5%, and *Strongyloides stercoralis* 0.01%.

The most common intestinal helminthes in this study was *E. vermicularis* in patients aged between 8 and 13 years.

Other species of intestinal helminthes such as *A. lumbricoides* (roundworm), *Trichuris trichiura* (whipworm), and *Ancylostoma duodenale* (hookworms) are not widely prevalent in Libya. These infections are mostly prevalent in tropical and subtropical regions of the developing countries where adequate water and sanitation facilities are lacking.[18,19]

Intestinal helminthes rarely cause death. Instead, the burden of disease is related to less mortality than to the chronic and insidious effects on health and nutritional status of the host.[20,21]

Microscopic examinations of all stool specimens collected using light microscopy and comparing the finding of the wet preparation procedure with the concentration technique revealed that the incidence of most parasites increases dramatically. Many intestinal parasites have disappeared completely, others are decreased to content, and no new parasites were detected.

Most of the laboratories in Tripoli city still depend on wet preparation method only, which makes the final report inaccurate, which we believe to be unreliable for usage in local diagnostic settings. Assay variations may be attributed largely to analysis methods and lag period between drawing stool sample and processing of the specimen.

We conducted single stool examination for the detection of intestinal parasites, which could have underestimated the prevalence, as optimal laboratory diagnosis of IPIs requires the examination of at least three stool specimens collected over several days to increase the significance of results.

Our study has some other limitations, especially the small sample size and the confinement to a single geographical area, that restricted the performance of certain other descriptive investigations.

This necessitates a multicentric approach to evaluate and compare the performances of healthy controls in regard to IPIs. Furthermore, the validity of comparison of the detection procedures depends on the comparability techniques and duration and temperature of sample storage which could differ significantly between studies.

The establishment of types and prevalence of parasitic infections with the local population is a helpful tool to clinicians for its better clinical management of intestinal specific-diseases in Tripoli and surrounding areas. The modern antigen detection tests and PCR-based tests need to be used for understanding the actual prevalence and epidemiology of these protozoan parasites. Further cohorts with greater sample size may be required to define the real number and kinds of parasites' inhabitant in the local general population and the new envisioning parasites.

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Conflicts of interest

There are no conflicts of interest.

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