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PARASITOLOGICAL STUDIES AMONG EGYPTIAN PATIENTS ATTENDED DIAGNOSTIC & RESEARCH UNIT OF PARASITIC DISEASES, KASR AL-AINY TEACHING HOSPITALS: A FIVE-YEAR RETROSPECTIVE STUDY

By
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Abstract

This is a retrospective study on recorded parasitic infections for in- and outpatients attended Diagnostic & Research Unit of Parasitology, Medical Parasitology Department, Kasr Al-Ainy Teaching Hospitals from 2017 to 2021. A total of 10557 samples were examined for parasites, *Helicobacter pylori* antigen detection and occult blood in stool.

Stool samples (21%) were infected with 15 species of intestinal parasites. These were *Blastocystis hominis* (13%), *Giardia lamblia* (3%), *Entamoeba histolytica* (3%), *Entamoeba coli* (1%), mixed infections (1.6%), *H. pylori* co-infection (2%), and occult blood with parasites (0.3%). Male to female infection ratio was 50.3% to 49.7%. The highest prevalence season of infection was autumn (31.5%). But, all these results were statistically non-significant ($p>0.05$).

Keywords: Greater Cairo, Outpatients, Prevalence, Parasites, *H. pylori*, occult blood.

Introduction

Parasitic infections especially intestinal protozoa are more or less neglected tropical diseases constitute a global health problem (Taghipour *et al*, 2021), especially among children in developing countries (Harhay *et al*, 2010). Prevalence of infections was governed by geographic, ecology, socioeconomic factors, and limited access to clean water, poor general sanitation, as well as family size and low income (Amer *et al,* 2018). Ingestion of contaminated food and water is the commonest infection route of different intestinal parasites, and also by skin penetration by infective larvae in polluted water or soil (Moses *et al*, 2013).

Despite the marked improvement in sanitation infrastructure and hygienic status, intestinal parasites still a significant Egyptian Health Challenge (Monib *et al*, 2016). Moreover, co-infection with *Heliobacter pylori* is common with intestinal parasitic infections as they share the same modes of infection and the same environmental conditions (Abd El Hameed *et al*, 2021), also the urease production by *H. pylori* facilitates crossing the stomach's acidic environment by the intestinal parasites (David *et al*, 2006). For the development of good preventive and control measures, epidemiological studies are important to have baseline data on the occurrence of parasitosis.

The study aimed to clarify the prevalence of parasites and co-infections from 2017 to 2021 among patients attended Kasr Al-Ainy Teaching Hospitals, Egypt from their records of the Diagnostic and Research Unit of Parasitic Diseases.

Materials and Methods

The present study is a retrospective analysis of 10557 samples from Diagnostic & Research Unit of Parasitology (DRUP) at Medical Parasitology Department, Kasr Al-Ainy Teaching Hospitals from 2017 to 2021 for parasites with or without *H. pylori* co-infection. Data collection was done by interpreting the inter-shift sheets of the DRUP over five years.

Stool samples of patients attended the DRUP were collected in sterile labeled plastic containers, and examined macroscopically for enterobiasis, gravid segments as the likes and microscopically using stained direct smear and concentration methods (Dyab *et al,* 2016).

Part of stool specimen was spread on a clean

slide, fixed with methanol and stained by modified Ziehl-Neelsen (Akinbo *et al*, 2010), to detect oocysts of *Crystosporidium* species, *Isospora belli, Cyclospora cayetanensis.*

Statistical analysis: Data determined the annual parasites, seasonally and by sex which was calculated and presented in tables and graphs. All analysis was done using EXCEL2020, SPSS program version number (28). Prevalence of infection was analyzed using simple percentage. Chi-square test associated between prevalence of intestinal parasites per year, seasons and sex. The P-values less than 0.05(p<0.05) were significant.

Results

Out 10557 patients, 4916 (46.6%) were males and 5641 (53.4%) were females. Drop in patinnts' number in year 2020 (12.2%) due to Corona Quarantine, but higher number in 2019 (25.7%) was just before Corona Pandemic. Details were given in tables (1 & 2) and figures (1 & 2).

Table 1: Total patient attended DRUP from 2017-2021:

	Number of patients										Total by sex	
	2017		2018		2019		2020		2021			
Patient	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Male	911	48%	1248	46.8%	1278	47%	590	45.7%	889	45%	4916	46.5%
Female	987	52%	1421	53.2%	1439	53%	700	54.3%	1094	55%	5641	53.5%
Total per year	1898	18%	2669	25.1%	2717	25.7%	1290	12.2%	1983	19%	10557	

Table 2: Prevalence of intestinal parasites in a descending order by DRUP analysis from 2017-2021:

	Prevalence of parasites per year										Total by parasite type	
	2017		2018		2019		2020		2021			
Name of parasite	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Blastocystis hominis	92	11%	138	12%	147	13%	88	19%	95	12%	560	13%
Giardia lamblia	34	4%	55	5%	25	2%	15	3%	7	1%	136	3%
Entamaeba histolytica	24	3%	26	2%	30	3%	25	5%	31	4%	136	3%
Entamaeba coli	1	0%	10	1%	7	1%	11	2%	9	1%	38	1%
Cryptosporidium	6	1%	4	0%	2	0%	4	1%	4	1%	20	0%
Isospora belli	0	0%	0	0%	4	0%	0	0%	0	0%	4	0%
Ascaris lumbricoides	3	0%	1	0%	0	0%	0	0%	0	0%	4	0%
Ancylostoma duodenale	3	0%	2	0%	0	0%	1	0%	0	0%	6	0%
Hymenolepis nana	0	0%	3	0%	5	0%	4	1%	0	0%	12	0%
Schistosoma mansoni	0	0%	1	0%	0	0%	0	0%	1	0%	2	0%
Capillaria phillipenensis	1	0%	0	0%	1	0%	1	0%	0	0%	3	0%
Fasciola species	1	0%	0	0%	1	0%	0	0%	0	0%	2	0%
Taenia segment	0	0%	0	0%	0	0%	1	0%	0	0%	1	0%
Strongyloides stercoralis	0	0%	1	0%	0	0%	0	0%	0	0%	1	0%
Mite eggs	0	0%	1	0%	2	0%	0	0%	5	1%	8	0%
Mixed infection	11	1.3%	13	1.1%	19	1.7%	17	3.7%	9	1.1%	69	1.6%
Co infection *H pylori*	7	0.8%	11	1%	38	3.4%	22	4.8%	14	1.8%	92	2%
Occult blood in stools	1	0.1%	7	0.6%	2	0.2%	1	0.2%	3	0.4%	14	0.3%
Total infected	165	20%	242	21%	224	20%	150	33%	152	19%	933	21%
Total examined stool	843		1157		1105		459		798		4362	

Discussion

In the present study, out of 4362 stool samples examined during the study (2017- 2021), 933 (21%) were infected with 15 species of intestinal parasites; six species of protozoa, eight intestinal helminthes and an arthropod were identified in stool analysis. Overall, the prevalence of protozoa (20%) was higher than helminthes (1%). The commonest parasites were *B. hominis* (13%), *E. histolytica* (3%), *E. coli* (1%), *G. lamblia* (3%), but others were *C. parvum* (n=20), *H. nana (*n=12), mite eggs (n=8) *A. duodenale* (n=6), *I. belli* (n=4), *A. lumbricoides (* n=4), *C. phillipenensis* (n=3), *S. mansoni* (n=2), *Fasciola* species (n=2), *Taenia s*egments (n=1) and *S. stercolaris* (n=1). The parasites rates were low in females (49.3%) than in males (50.7%), but without significant difference (P>0.05). *B. hominis* showed highest protozoan rate among sexes

(63% in females & 61% in males), and also *H. nana* showed highest helminthic rate (1% in females & 2% in males). El Shazly *et al.* (2006) in Dakahlia Governorate reported helminth in a descending were: *S. mansoni* (5.3%), *Fasciola* sp. (4.8%), *H. heterophyes* (4.2%), *Hymenolepis nana* (3.9%), *Trichostrongylus* sp. (2.6%), *A. lumbricoides* (1.8%), *S. stercoralis* (1.5%), *H. diminuta* (1.4%), *T. saginata* (1.1%), *E. vermicularis* (1.1 %), *T. trichura* (0.7%), and *A. duoden- ale* (0.1%), but protozoa were *B. hominis* (22.4%), *G. lamblia* (19.6%), *E. histolytica*/*dispar* (19%), *I. butschlii* (16%), *C. parvum* (14.3%), *E. coli* (9.7%), *I. hominis* (7.7%), *E. nana* (6.9%), *T. hominis* (4.2%), *Cy. cayetanensis* (4.2%), *Microsporidia* spores (3.2%), *Enteromonas hominis* (1.9%) and *Embadomonas intestinalis* (1.3%).

In the present study, parasites were more or less similar seasonally, without significant differe- nces (P>0.05). But, the highest infection rate was 31% in autumn, followed by 24% winter, 23% spring, and 22% summer. Mixed parasitic infection was 1.6%, parasites co-infection with *H. pylori* was 2%, and fecal occult blood was 0.3%. Generally, parasites are the worldwide co-mmonest cause of illness, and critical threats due to morbid nature (Hailu and Ayele, 2021). So, knowing the parasites distribution paved the way for feasible control programs (McCarthy *et al*, 2012). Reports on prevalence rates of parasites vary in different localities in Egypt. In Cairo region, about 51% of the patients complaining of gastrointestinal symptoms were positive for different intestinal parasitic infections (Hussein *et al*, 2017). These parasites are transmitted by fecal-oral pathway, either directly from person to person or indirectly via consumption of contaminated food and water, but asymptomatic diseases carriers provide a risk of community transmission (Aly and Mostafa 2010).

In the present study, 21% of the examined stool samples were positive for different intestinal parasitic infections. This prevalence was similar to that reported in Egypt. The prevalence among school children in El-Minia Governorate was 29.3% (Ibrahium, 2011). While higher prevalence rates of 41.9 % and 69.3% were detected in Assuit Governorate (Kotb *et al,* 2011).

In the present study, prevalence of protozoa infection (20%) was higher than that of helminthes ones (1%). Higher prevalence rates of protozoan infection were reported in Egypt (El Shazly *et al,* 2007; Ibrahium, 2011; Kotb *et al,* 2011; Mohammad *et al,* 2012; El-Bahnasawy *et al,* 2018).

The high prevalence of protozoan infection in this study suggested contamination of drinking water (Bhat *et al,* 2013).

The rate of mixed double infections was 1.6%, which was much lower than previous reports from Egypt (El-Masry *et al,* 2007; Bauomy *et al,* 2010; Kotb *et al,* 2011).

In terms of the detected intestinal parasites; *Blastocyst hominis* had the highest infection rate (13%), followed by *Giardia intestinalis* (3%), *E. histolytica/dispar* (3%) while *Hymenolepis nana* had the highest infection among helminthes (table 2).

Blastocystis was the most frequently rintestinal parasite with a high prevalence worldwide (Eassa *et al,* 2016; Rebolla *et al,* 2016). This agreed with El Deeb and Khodeer (2013) who reported the prevalence of *Blastocystis* spp. 34.5% in iron deficiency anemic and non-anemic individuals in Menoufia Governorate. Also, El-Badry *et al.* (2018) who reported prevalence of 19.1% in patients attended Beni-Suef University Hospitals. But, high *Blastocystis* prevalence rates were reported among children in Alexandria (67.4%) and Gharbia (53%) governorates respectively (Eassa *et al*, 2016; El-Marhoumy *et al*, 2015)

In the current study, the prevalence of *H. pylori* co-infection with parasites was 2%. But, abroad the focus on co-incidence of *H. pylori* and protozoa (especially *Giardia*) was more emphasized than helminths (Júlio *et al,*

2012). Both *H. pylori* and gastrointestinal parasites share the same estimated risk factors; including poor sanitation and hygiene, low socioeconomic conditions and overcrowded populations **(**Cheng *et al,* 2009). This agreed with Kibru *et al*. (2014) in Ethiopia reported that intestinal parasites were significantly associated with *H. pylori* infection. The co-infections may be due to same transmission routes; contaminated food and water (Seid *et al*, 2018). However, Schmid *et al.* (2021) in Switzerland reported that protozoan *G. lamblia* (GL) and the bacterium *H. pylori* (HP) are common causes of gastrointestinal disease.

In the present study, prevalence of fecal occult blood with intestinal parasite was 0.3%. This was detected as cause dysentery or blood losses with *Schistosoma mansoni Trichuris trichiura, Ancylostoma duodenale*, and *E. histolytica*. But, Okamoto *et al*. **(**2005) in Japan found that the 4 asymptomatic cases with positive fecal occult blood (FOB) test and amebic colitis indicated *E. histolytica* infection.

In the present study, males had a higher prevalence of intestinal parasites (50.7%) than females (49.3%), but without significant difference (p >0.05). Bauomy *et al*. (2010**)** Kotb *et al*. (2011) in Assuit Governorate found higher rates among males than females (54.9% & 45.1% and 60% & 40% respectively). Also, Ibrahium (2011) in Minia Governorate reported higher prevalences among males than females. El-Sherbini and Abosdera (2013) in Giza Governorate recorded higher infection rates of intestinal parasites among male children. Hailu and Ayele (2021) in Debre Berhan, Ethiopia reported more parasites among male school children

In the present study, highest rates of infection were during fall months (31%) and the lowest ones were in summer (22%). This agreed with Amer *et al,* (2018**)** in Riyadh, Saudi Arabia who found relationship between seasonality and intestinal parasitic infections, with the highest in autumn. However, Eraky *et al.* (2014) in Benha City found that the high risk of acquiring parasitic infection was in summer due to consumption of raw vegetables, and fruits. Ismail *et al.* (2016) reported that giardiasis was detected all the year around with a peak in mid-summer and late winter.

In the present study, showed seasonal variation in prevalence of intestinal parasites, but without statistical significance (p>0.05). This agreed with Akinbo *et al,* (2011), who reported that intestinal parasitism was not seasonally significant.

Conclusion

Parasites are still a public health problem in Greater Cairo that must be in concern with the Public Health Authorities using appropriate statistical data to develop effective prevention and control strategies. No doubt, intestinal parasites are one of the health problems in children and immuno-compromised patients.

The high prevalence of intestinal protozoa was among patients were *Blastocystis hominis, Entamoeba histolytica* and *Giardia lamblia,* which are of health concern as transmitted via feco-oral routes. Improving sanitation, safe water supplies, and educating people on personal and environmental hygiene are indicated to control parasites and *H. pylori*.

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Explanation of figures

Fig. 1: Total patients (males & females) attended DRUP from (2017-2021).

Fig. 2: Distribution of intestinal parasitic infection during different seasons of study.