Original article

Prevalence of intestinal parasites in the area of Parma during the year 2005

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Abstract. *Background and aim of the work:* Intestinal parasitosis represent a relevant clinical problem, especially in developing countries, where they are responsible for morbidity and mortality in adults and children and many epidemiological data are available for these areas. The actual situation of intestinal parasitosis in Europe is not yet well investigated since they are usually not notified. We describe the occurrence of intestinal parasitosis in our laboratory from January to December 2005. *Methods:* We considered all patients (1117) whose stool samples were sent to our laboratory with the suspect of intestinal parasitosis during the year 2005. Each specimen was subjected to macroscopic and microscopic examination to demonstrate the presence of worm eggs, larvae, protozoan trophozoites or cysts and to an immunochromatographic assay to detect *Giardia intestinalis* and *Cryptosporidium spp.* specific antigens. Cultures for protozoa and helminths were carried out and a PCR specific for *Entamoeba histolytica/Entamoeba dispar* was also performed. *Results:* Our results indicated that 148 patients (13,24%) were affected by intestinal parasitosis. Among the 951 Italians, 96 (10%) were infected, while out of a total of 166 foreigners 52 had intestinal parasitosis (31%). Moreover, we found that 113 infections were caused by only one parasite while 35 were mixed infections. *Conclusions:* Intestinal parasitosis represent a remarkable cause of gastrointestinal disease and our study demonstrates that these infections are quite common in our area, affecting both Italians and non European citizens from developing countries. (www.actabiomedica.it)

Key words: Intestinal parasitosis, diarrhoea, gastrointestinal disease

Introduction

Acute gastrointestinal illnesses are extremely common in developing countries and intestinal parasitic infections are among the most important health problems in those areas, where a large number of people is infected every year and parasitic infections are responsible for considerable morbidity and also mortality (1).

The highest rates of protozoa and helminths infections worldwide occur in the tropical regions and the distribution of these infections depends on conditions such as suitable climate and human activities, population movements and poor sanitation (2). Diarrhoea, including that of parasitic origin, remains one of the most common illnesses in children, and one of the major causes of infant and childhood mortality in developing countries, as reported by the World Health Organization (WHO) (3).

Many epidemiological data on the diffusion and prevalence of intestinal parasitosis are available for developing areas (2, 4-6), but in industrialised countries intestinal parasitosis are usually not notified and few data are reported in the literature (6). Information is available for some European nations on the WHO internet website concerning only the number of cases/year and the incidence of amoebiasis and giardiasis, since 1995 to 2006 (7).

Some information on the distribution of intestinal parasitosis in Italy is available, but most of the reports consider only selected groups of people (children, HIV infected or institutionalised psychiatric patients) (8-11) hindering the extension of the data to the general population.

In the past (1992-1993) we carried out an 18 month investigation in our laboratory, observing a prevalence of parasitosis among foreign people (12). We recently observed an increasing number of diagnostic investigations that are required for intestinal parasitosis and decided to verify the present situation.

The aim of our study was to describe the occurrence of parasitic intestinal infections in our area, considering all patients (hospitalised or outpatients) with the suspect of intestinal parasitosis whose faecal samples were sent to our laboratory during the year 2005.

Materials and methods

In the present study we examined 1789 stool specimens from 1117 patients, not belonging to a selected population, collected from January to December 2005 at the Section of Microbiology, Department of Pathology and Laboratory Medicine of the University of Parma.

Specimens belonging to outpatients and hospitalised patients, arrived to our laboratory with a schedule reporting the supposed diagnosis and some clinical information such as symptoms and/or signs of infection and eventual therapy. For each patient at least three specimens that were collected every other day were available for the laboratory diagnosis and each sample arrived to the laboratory in the same day of the collection.

Stool samples were subjected to macroscopic examination, to check the consistency and to point out the presence of blood, mucus or adult worms. Moreover, saline wet mounts were prepared directly from faecal material and observed under a microscope with the 10X objective, to demonstrate the presence of worm eggs, larvae, protozoan trophozoites or cysts, and then with the 40X to capture the details (13-15). Mounts were also prepared from concentrated specimens with the formalin ethyl-acetate sedimentation technique (13-15) and observed in the same way. Simultaneously a rapid qualitative immunochromatographic assay (BD-ColorPAC™ *Giardia/Cryptosporidium* Rapid Assay) was performed according to the manufacturer's instructions to detect *Giardia intestinalis* and *Cryptosporidium spp.* specific antigens in aqueous extracts of faecal specimens (14).

Moreover, cultures using two different culture media, one for protozoa (Robinson medium) and one for helminths (non nutrient agar plates), were carried out as previously described (15) and observed every day for ten days and for 6 days, respectively.

When necessary, for the identification and differentiation of *Entamoeba histolytica* and *Entamoeba dispar* a discriminating Polymerase Chain Reaction (PCR) assay was used to complete the laboratory diagnosis, according to the previously described methods (15).

Results

Among the 1117 patients (951 Italians and 166 foreigners) whose stool samples (1789) were examined in our laboratory during 2005, 148 intestinal parasitic infections (13,24%) were diagnosed, 20 in children and 128 in adults, 84 in males and 64 in females.

Among the 951 Italians, 96 (10%) were infected while out of a total of 166 foreigners, 52 had intestinal parasitosis (31%).

As we summarized in Table 1, 113 infections were caused by only one agent. The most common protozoa detected were *Blastocystis hominis* (86), *Giardia*

Table 1. Patients with intestinal parasitosis caused by only one parasite

Parasites detected	Number of cases	Italians	Foreigners
Protozoa			
G. intestinalis	18	12	6
B. hominis	87	63	24
E. dispar	2	1	1
Helminths			
S. stercoralis	3	2	1
T. saginata	2	2	none
E. vermicularis	1	none	1
A. lumbricoides	1	1	none

Table 2. Patients with intestinal parasitosis by mixed infections

Number of patients	Parasites detected	Italians	Foreigners
7	*B. hominis* + *Entamoeba coli*	3	4
4	*G. intestinalis* + *B. hominis*	4	none
4	*S. stercoralis* + *B. hominis*	3	1
2	*E. vermicularis* + *B. hominis*	1	1
1	*S. stercoralis* + *B. hominis* + *Entamoeba coli*	none	1
1	*T. trichiura* + *G. intestinalis*+ *H. nana* + *B. hominis* + *Entamoeba coli*	none	1
1	*Taenia spp.* + *D. latum*	1	none
2	*E. histolytica* + *B. hominis*	none	2
1	*Acanthamoeba spp.* + *B. hominis*	none	1
1	*E. dispar* + *B. hominis* + *Entamoeba coli*	none	1
1	*D. fragilis* + *B. hominis*	1	none
1	*D. fragilis* + *B. hominis* + *Entamoeba coli*	none	1
2	*G. intestinalis* + *H. nana* + *E. dispar* + *B. hominis*	none	2
1	*G. intestinalis* + *E. dispar* + *B. hominis*	1	none
1	*S. stercoralis* + *H. nana* + *B. hominis* + *Entamoeba coli*	none	1
1	*A. duodenale* + *T. trichiura* + *B. hominis*	1	none
1	*E. histolytica* + *A. lumbricoides*	none	1
1	*G. intestinalis* + *Taenia spp.* + *B. hominis*	none	1
1	*Taenia spp.* + *B. hominis*	none	1
1	*Taenia saginata* + *B. hominis*	none	1

intestinalis (18) and *Entamoeba dispar* (2), while the helminths were *Strongyloides stercoralis* (3), *Taenia saginata* (2), *Enterobius vermicularis* (1) and *Ascaris lumbricoides* (1).

Moreover, we found 35 mixed infections as described in Table 2. In particular, the more frequent associations were: *Blastocystis hominis* + *Entamoeba coli* (7), *Giardia intestinalis* + *Blastocystis hominis* (4), *Strongyloides stercoralis* + *Blastocystis hominis* (4), *Enterobius vermicularis* + *Blastocystis hominis* (2) and *E. histolytica* + *B. Hominis* (2). We also found two multiple infections by *Giardia intestinalis* + *Hynenolepis nana* + *Entamoeba dispar* + *Blastocystis hominis*. Mixed infections were found in 20 foreign and in 15 Italian patients.

Clinical information reported in the schedule sent to our laboratory with faecal samples (only available for 31 patients with diagnosed intestinal parasitosis, as described in Table 3) indicated that frequent symptoms and signs included abdominal pain, diarrhoea, fever, rectal bleeding and/or perianal pruritus; in some cases concomitant pathologies were reported, such as HIV infection, cirrhosis and neoplasia. For the remaining 117 patients clinical information was not available or if present was not related to the request for parasitological diagnosis.

Conclusions

The data shown in our study demonstrate that intestinal parasitosis represent common pathologies and remarkable causes of gastrointestinal disease in our area.

When comparing our data with the results of the parasitological investigations carried out from May 1992 to December 1993 in our laboratory (12), it can be observed that the data are quite similar, even if in the present study they concern only one year.

Infact, *B. hominis, G. intestinalis*, *Entamoeba coli* and *D. fragilis* remain the more frequent protozoa detected and *S. stercoralis*, *Taenia spp*. and *E. vermicularis* are the most representative among helminths.

We also tried to compare our data with other reports in Italy but these often describe the occurrence of intestinal parasitosis in a selected population such as HIV-infected patients, immigrants, institutionalised psychiatric patients, travellers, children (8-11).

We did not select a group of people but considered all patients (hospitalised or outpatients) whose stool samples were sent to our laboratory during the year 2005, obtaining information on the occurrence of intestinal parasitosis that may be representative of the general population.

Table 3. Clinical information available for patients affected by intestinal parasitosis

Patient code	Parasites detected	Clinical signs and symptoms	Concomitant pathologies
1	*B. hominis*	Abdominal pain	Not reported
2	*S. stercoralis*		Chirrosis
3	*E. dispar+Entamoeba coli+B. hominis*		Situs viscerum inversus
4	*E. vermicularis+B. hominis*		Not reported
5	*B. hominis*	Abdominal pain, perianal pruritus, diarrhoea	Not reported
6	*S. stercoralis+B. hominis*	Diarrhoea, eosinophilia	Lung carcinoma
7	*B. hominis*		Not reported
8	*S. stercoralis+Entamoeba coli+B. hominis*	Eosinophilia	Not reported
9	*B. hominis*		Not reported
10	*S. stercoralis*		HIV infection
11	*B. hominis*	Diarrhoea	Not reported
12	*B. hominis*		Not reported
13	*B. hominis*		Not reported
14	*D. fragilis+Entamoeba coli+B. hominis*		Not reported
15	*G. intestinalis+ B. hominis*		HIV infection
16	*G. intestinalis+ B. hominis*		Not reported
17	*G. intestinalis+ B. hominis+E. dispar*		HIV infection
18	*E. histolytica+A. lumbricoides*		Not reported
19	*G. intestinalis*		Not reported
20	*G. intestinalis*		Not reported
21	*B. hominis*		HIV infection, Intestinal spirochaetosis
22	*B. hominis*	Fever, diarrhoea	Not reported
23	*G. intestinalis*	Rectal bleeding	Not reported
24	*E. histolytica+B. hominis*	Hepatomegaly	Kidney failure, malaria
25	*Entamoeba coli+B. hominis*	Not reported	Lung cyst
26	*B. hominis*	Not reported	Chirrosis
27	*B. hominis*	Not reported	Malaria
28	*B. hominis*	Cutaneous lesions	Not reported
29	*Entamoeba coli+B. hominis*		Not reported
30	*B.hominis*		Not reported
31	*B. hominis*		Not reported

We observed that 52 foreign patients (31%) were affected by intestinal parasitosis, demonstrating that immigration can contribute to the occurrence of these infections even if it cannot be the only responsible risk factor. Moreover, a particular group of foreign patients whose faecal samples were sent to our laboratory was observed in our study: we analyzed stool of 14 adopted children from developing countries and we detected that 6 of them were affected by intestinal parasitosis. In particular, three children coming from India, Colombia and Russia respectively, had multiple infections, one by *T. trichiura, G. intestinalis, H. nana, B. hominis, Entamoeba coli*, one by *B. hominis* and *Entamoeba coli* and the other by *E. histolytica* and *B. hominis*. Thus, we consider that the possibility of monitoring such children since their arrival in Italy is very important in order to ensure their healthy growth.

Concerning other possible risk factors, we know that only four patients with diagnosed intestinal parasitosis were HIV-infected and one of them was also

infected by intestinal spirochaetes and had a clinical history of long-standing diarrhoea.

Among the mixed infections we diagnosed an intestinal parasitosis caused by *Taenia spp*. and *D. latum*: this seems to be a very singular case because of the coexistence of these two cestodes. We asked clinical information to the doctor in charge of the case and he explained to us that the patient suffered from chronic anaemia, probably related to the infestation by *D. latum*. We also asked to analyse repeated faecal samples of this patient and the diagnosis was definitively confirmed.

In conclusion, even though our laboratory is in a non-endemic area, intestinal parasitosis represent frequent diseases that are probably associated to travelling through endemic areas, the adoption of children from developing countries, precarious hygienic conditions and immigration.

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