EPIDEMIOLOGY OF INTESTINAL PARASITOSES IN A TERTIARY-CARE HOSPITAL IN ITALY: A 5-YEAR STUDY

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Introduction and Purpose. Although the prevalence of parasitic infections is higher in developing countries, intestinal parasitoses represent frequent diseases also in industrialized ones probably depending on the globalisation of the food supply, on the immigration/adoption from endemic regions, and on the travels through the same areas. The epidemiology of intestinal parasitoses in Europe is underestimated since they are usually not notified. The aim of this study was to describe the occurrence of parasitic intestinal infections in a non-endemic setting, as detected in patients (hospitalised and outpatients) with the suspicion of intestinal parasitosis (a non-selected population) whose faecal samples were sent to our laboratory during the period 2006-2010.

Methods

15,722 faecal samples
8,886 patients
with the suspicion of intestinal parasitosis
in the period 2006-2010

BASIC DIAGNOSTIC METHODS

Macroscopic and microscopic examination

Immunochromatographic assay for the detection of specific antigens of *Giardia intestinalis* and *Cryptosporidium* spp.

Scoth test for the detection of ova and adult stages of *Enterobius vermicularis*


(Modified from: Calderaro A, 2012)


(Modified from: Calderaro A, 2012)


(modified from: www.cdc.gov)

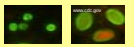
SPECIFIC DIAGNOSTIC METHODS applied to selected samples when the following features were reported/observed:

- Risk factors for parasitic infections
- Eosinophilia
- Bloody faeces
- Presence of diagnostic stages of parasites in the faeces

Cultures for protozoa in Robinson medium and for larvae of intestinal nematodes by agar plate culture concentration (1,652 faecal samples belonging to 906 patients)


(Modified from: Calderaro A, 2012)

Immunofluorescence assay for the detection *Giardia intestinalis* and *Cryptosporidium* spp.



Entamoeba histolytica and *E. dispar*: differentiation by FRET real-time PCR (1,652 faecal samples belonging to 906 patients)


(Modified from: Calderaro A, 2012)

Dientamoeba fragilis: detection by hydrolysis probe real-time PCR assay (959 faecal samples belonging to 451 patients) - sequencing of the amplification product (genotyping)


(Modified from: Calderaro A, 2012)

Results. Intestinal parasites were detected in **2,630** samples belonging to **1,477** patients (prevalence of **16.6%**), whose demographic data are reported in Figure 1. Clinical data regarding the patients whose samples were found containing protozoa and/or helmints indicated that the most reported symptoms and signs included abdominal pain, diarrhoea, rectal bleeding and/or perianal pruritus. Cases of intestinal parasitosis are reported in Table 1 with origin, age and sex of the patients. In Figure 2 the prevalence of the parasitoses is reported. Single parasitic infections were observed in 1,150 cases (77.9% out of the total of patients with intestinal parasitosis), whilst mixed parasitic infections were observed in 327 cases (22.1% out of the total of patients with intestinal parasitosis) (Figure 3). On the total of the parasites detected in this study (1,915), the frequency of detection of protozoa was 93.4% (1,789 cases) and that of helminths was 6.6% (126 cases). As concerns the sequencing of the amplification products obtained from *D. fragilis* infected patients, in 5 cases it evidenced a substitution of a T with an A in the 28th base of the amplicon, as compared to the deposited sequence of *D. fragilis* 5.8 S rDNA in the GenBank (accession number: DQ233450).

Figure 1. Demographic data of the patients with intestinal parasitosis.

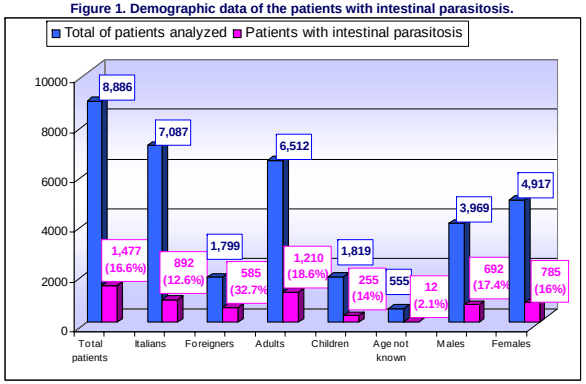


Figure 3. Single and mixed parasitic infections detected in this study with age, origin and sex of infected patients (8 cases of single parasitosis and 4 cases of mixed parasitosis are related to patients whose age was unknown)

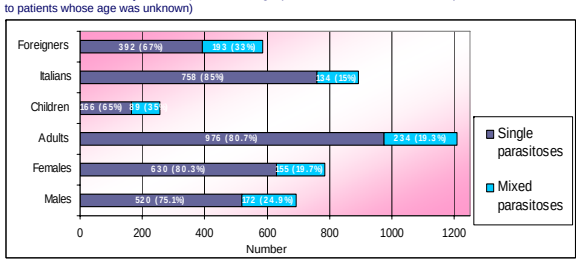
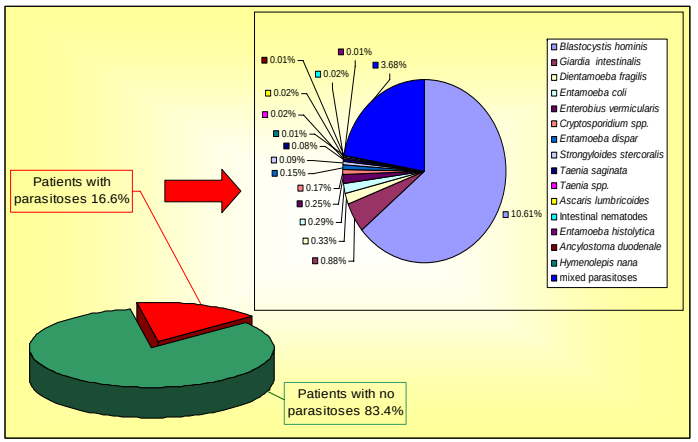


Table 1. Patients with intestinal parasitosis and their demographic data (age, origin and sex) .

Patients with parasitoses		Origin		Age			Sex	
Parasites	No.	Italian	Foreigner	Adult	Child	Unknown	Male	Female
Single parasitoses	**1150**	**758**	**392**	**976**	**166**	**8**	**520**	**630**
Blastocystis hominis	943	638	305	834	103	6	407	536
Giardia intestinalis	78	43	35	48	30	0	51	27
Dientamoeba fragilis	29	20	9	22	7	0	12	17
Entamoeba coli	26	12	14	17	9	0	10	16
Enterobius vermicularis	22	14	8	12	10	0	7	15
Cryptosporidium spp.	15	13	2	11	4	0	10	5
Entamoeba dispar	13	7	6	11	1	1	7	6
Strongyloides stercoralis	8	1	7	8	0	0	6	2
Taenia saginata	7	6	1	7	0	0	4	3
Taenia spp.	2	0	2	2	0	0	1	1
Ascaris lumbricoides	2	2	0	1	1	0	2	0
Intestinal nematodes	2	1	1	2	0	0	1	1
Entamoeba hisyolytica	1	1	0	1	0	0	1	0
Ancylostoma duodenale	1	0	1	0	0	1	1	0
Hymenolepis nana	1	0	1	0	1	0	0	1
Mixed parasitoses	**327**	**134**	**193**	**234**	**89**	**4**	**172**	**155**

Figure 2. Prevalence (%) of the intestinal parasitoses diagnosed in 1,477 patients in this study.



Among **mixed parasitoses** the most frequent combinations were *B. hominis* and *Entamoeba coli* (56), *B. hominis* and *D. fragilis* (54), *B. hominis* and *G. intestinalis* (44), *B. hominis* and *E. dispar* (20), *B. hominis*, *E. coli* and *D. fragilis* (18). Eleven patients presented with 4 simultaneous parasitoses, 3 patients with 5 simultaneous parasitoses and 1 patient with 6 simultaneous parasitoses, both by protozoa and helminths.

Conclusion. Even though our laboratory is located in a non-endemic region for parasitic infections transmitted by faecal-oral route, the prevalence of intestinal parasitoses was unexpectedly high (16.6%). In our study *B. hominis*, often reported as the most commonly detected intestinal protozoan in parasitological surveys, resulted the most frequent detected intestinal protozoa, with an overall prevalence of 13.89%. *Giardia* was the second parasite and the first with established pathogenicity detected in the analysed population with an overall prevalence of 1.89%. The frequency of infections by protozoa resulted higher than that of helminthiasis (93.4% vs. 6.6%) which are, as expected, prevalent in foreign patients (mainly immigrants from developing countries). Interestingly, mixed infections by different intestinal parasites, both protozoa and helminths, are remarkably frequent (22.1%) especially in patients from developing areas. As concerns the cases of *D. fragilis* infection, the modified sequence detected in our study 5 cases was previously observed in the 5.8S rDNA sequence of the genotype 2 of *D. fragilis*, till now detected only in 2 clinical samples all over the world.
Epidemiological data about intestinal parasitoses are often restricted to developing countries, being those endemic areas for infections transmitted by faecal-route; however, epidemiological surveys also in non-endemic areas revealed to be essential in order to better know the prevalence and the distribution of intestinal parasites in the population and, as a consequence, to provide the measures to adopt both for preventive control and for adequate patient care. In this regard, this study makes a contribution in the definition of the epidemiology of intestinal parasitoses in Italy, taking into account that till now in our country recent epidemiological reports are restricted to a selected population, except for a study on a broad spectrum of patients.

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