



Abdominal pain and asthenia as common clinical features in hospitalized children for giardiasis

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ABSTRACT

Giardiasis is a disease with worldwide distribution, although its prevalence differs from country to country. In order to investigate the clinical pattern of giardiasis in in-patient children, a case-control study was carried out. In-patient children who had *Giardia lamblia* infection were compared with non *Giardia*-infected children, focusing only on 4 clinical manifestations: diarrhoea, abdominal pain, asthenia and vomiting. In multivariable analysis, abdominal pain (odds ratio [OR] 4.71, 95% confidence intervals [CI] 2.66–8.32) and asthenia (OR 3.30, 95% CI 1.16–9.37) had positive and independent associations with *Giardia* infection. The present study supports the potential role of *G. lamblia* in abdominal pain in children who attend- and are admitted- to a hospital in Havana City, and highlights the importance to keep abdominal pain and asthenia in mind in hospital admitted children in the event of an association with an evocative epidemiological context.

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1. Introduction

Giardiasis is a disease with worldwide distribution, although its prevalence differs from country to country. This protozoan disease may be seen in high income countries (HIC); however, it is mainly found in low (LIC) and lower middle income countries (LMIC). *Giardia lamblia*, is implicated in two main epidemiological scenarios- (1) diarrhoea in young children in LIC and LMIC; and (2) sporadic outbreaks of self-limiting diarrhoea in otherwise healthy individuals, mainly in HIC. Additionally, it may be observed when travellers from areas where giardiasis is uncommon return ill from endemic areas (Escobedo et al., 2010).

Most *Giardia* infections are either asymptomatic or present as a diarrhoeal disease with or without malabsorption, often accompanied by nausea, vomiting and weight loss (Escobedo et al., 2010). The factors which determine whether *G. lamblia* infection is symptomatic or not remain obscure as do the pathogenic mechanism that underlie the clinical picture.

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In Cuba, a prevalence of 20% has been recorded among young children attending day-care centres (Núñez et al., 1999). Additionally, clinical giardiasis seems to be a common reason for hospitalization in paediatric hospitals in Havana (Escobedo et al., 2011).

As the presence of *Giardia* is usually asymptomatic, many people are unaware of the presence of this intestinal protozoan. However, symptoms such as abdominal pain and fatigue have been reported by others (Buch et al., 2002; Younas et al., 2008; Zeyrek et al., 2008; Mørch et al., 2009a; Handoussa et al., 2005). Most clinical studies refer to hospitalized patients sporadically infected in developed countries, and more investigations are needed in endemic areas of developing countries. We decided to investigate the clinical pattern of giardiasis at the Academic Paediatric Hospital of Cerro (APHC), Havana, Cuba, comparing children who had *G. lamblia* infection with non-infected children.

2. Subjects and methods

2.1. Study setting

APHC is a 126-bed multidisciplinary, urban regional hospital that provides in-patient and out-patient medical services mainly

to the paediatric population of the municipality of Cerro and its surroundings, and has ~4000 children admitted each year. Health care in Cuba is free and, alongside an excellent primary health care system, there is an advanced level of secondary and tertiary care (Rodríguez et al., 2008).

2.2. Design

A case–control study was conducted. Consecutive children (0–16 years) admitted to the hospital over a 6-month period were eligible for the study. Children with chronic diseases or signs of sepsis were excluded. A case was a patient with *Giardia* infection – diagnosed from faecal specimens-, with or without diarrhoea. Controls were sex-matched, non-infected children (based on three faecal examinations), who were admitted to general medical wards of the same hospital during the same period of time. No attempts was made to differentiate between *Giardia* assemblages.

2.3. Procedures

During hospitalization, each parent or legal guardian was given three labelled plastic vials containing 10% formalin solution and was advised to collect three faecal samples from the child during a one week period. All faecal samples were retrieved and transported to the laboratory of Intestinal Parasites in the Tropical Medicine Institute “Pedro Kourí”, in Havana City. They were examined microscopically for ova, larvae and parasites by direct wet mount and Ritchie’s concentration techniques. The examination was complemented by the modified Ziehl-Neelsen technique in search of intestinal coccidia (García and Bruckner, 1993).

A specific questionnaire was administered during the first 24 h after admission personally by one of the authors to all parents or legal guardians of each child and clinical manifestations were recorded, focusing only on 4 clinical manifestations: (a) diarrhoea, that was defined as a change in bowel habits, including either an increase in the frequency or amount of stool or a change in the consistency, as determined by the individual, if an adolescent or by the parents in the case of children; (b) abdominal pain, considered to be significant if it was severe enough to interfere with the child’s daily activities, such as school attendance, social activities or participation in sports and extracurricular activities; (c) vomiting and (d) asthenia, defined as the lack of strength or feeling of inability to carry out daily tasks, which was more intense at the end of the day, and usually improved after a period of sleep.

2.4. Ethical clearance

The study was approved by the Ethics Committee of the Academic Paediatric Hospital of Cerro. Informed consent was obtained not only from the child’s parent or legal guardian of each child but also from each enrolled child aged 7–16 years after the nature of the procedures had been explained.

2.5. Statistical analysis

Ninety four cases and 247 controls were sufficient to estimate an odds ratio (OR) of 2.5 or more, with power of 80% and precision of 95%, for exposure of >13%. The required sample size was estimated by using predicted prevalences, but the study size has power to estimate association when exposures are more frequent than 13% or OR are higher than 2.5. An additional 10 control children were included for possible drop-outs. Finally, a proportional distribution was made according the number of children admitted in different wards.

Proportions of ages and intestinal infections in different groups of patients were compared by using the χ^2 or the Fisher exact

test when required by data scarcity. The OR and 95% confidence intervals (95% CI) were used to measure the risk for every clinical characteristic according to the presence of *Giardia* infection. A significance level of 0.05 was adopted for all tests.

3. Results

The overall prevalence of *Giardia* was 26.8%. The possibility of *Giardia* infection was similar between both sexes (OR 0.74; 95% CI: 0.45–1.22). The 94 (26.8%) children positive for *Giardia* [median age: 4 years, range: 0–15, and inter-quartile range: 2–8 years] and 257 children negative for *Giardia* [median age: 3 years, range: 0–15, and inter-quartile range: 1–6 years] were included in the study. The median age was higher in the group of *Giardia* infected patients (Mann–Whitney *U* test, $P=0.0027$). Both abdominal pain (OR 6.06; 95% CI: 3.51–10.45) and asthenia (OR 3.28; 95% CI: 1.15–9.43) were statistically significantly more common in the children who were positive for *Giardia*. After multivariate analyses, abdominal pain and asthenia continued being significantly associated with *Giardia* infection, (OR 4.71, 95% CI 2.66–8.32) and (OR 3.30, 95% CI 1.16–9.37), respectively, even after controlling for *Blastocystis* spp. infection. Diarrhoea and vomiting were not statistically more common (Table 1).

Giardia was identified as a single pathogen in 38 children (10.8%). The protozoa most commonly co-isolated with *Giardia* were *Blastocystis hominis* (39 children, 11.1%), and *Entamoeba coli* (19 children, 5.4%). Both, the commensals *B. hominis* and *E. coli* were more likely to be present in children with giardiasis (Table 1). However, when we analysed the group of children coinfecting with *Blastocystis*, they are not a higher risk of abdominal pain or asthenia than those not coinfecting (OR 0.76; 95% CI 0.45–1.28 and OR 1.32; 95% CI 0.72–2.41, respectively).

4. Discussion

Our study confirms previous studies where abdominal pain has been identified as one of the main clinical manifestations associated with giardiasis (Buch et al., 2002; Younas et al., 2008; Zeyrek et al., 2008; Yakoob et al., 2005). Studies in Kashmir, Pakistan and Turkey involving between 85 and 239 children in each study, identified abdominal pain as a symptom in 31% (Younas et al., 2008; Zeyrek et al., 2008), 67% (Buch et al., 2002) and 71% (Yakoob et al., 2005) of patients, respectively. Even after *Giardia* infection has finally been eliminated, it seems that some sequelae may persist, affecting the quality of life, and continuing to cause the patient discomfort and pain (Robertson et al., 2010). Relatively large numbers of patients seeking help for long lasting abdominal symptoms after *Giardia* infection, without revealing any specific illness which can explain the symptoms, have been described by different authors (Mørch et al., 2009a; Hanevik et al., 2007; Mørch et al., 2009b).

Asthenia, was the other symptom that was significantly found among our cases. This is a general symptom which is considered the lack of strength or feeling of inability to carry out daily tasks; this is more intense at the end of the day, and usually improves after a period of sleep. As abdominal pain, is not specific to *Giardia* infection and may be overlooked. Other studies have reported fatigue, a close asthenia-related symptom, in patients with giardiasis (Handoussa et al., 2005), and also being associated even after successful treatment for giardiasis (Mørch et al., 2009a, 2009b). Medically, fatigue is the early onset of tiredness after an activity has been started; it is a sensation of exhaustion or difficulty to carry out physical or intellectual activities, without recovery after a period of rest (Sánchez Rodríguez et al., 2005). It has been categorized according to the time of evolution of the symptom into recent fatigue, prolonged fatigue and chronic fatigue (less than one month,

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