

Giardiasis: a diagnosis that should be considered regardless of the setting

Angel A. Escobedo^{1,2}, Pedro Almirall³, Kurt Hanevik^{4,5}, Sérgio Cimerman⁶,
Alfonso J. Rodríguez-Morales^{2,7}, Caridad Almanza⁸ and
Jhossmar Auza-Santivañez⁹

Commentary

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Author for correspondence:

Angel A. Escobedo,
E-mail: escobedo@infomed.sld.cu

¹Academic Paediatric Hospital ‘Pedro Borrás’ La Habana, Cuba; ²Working Group on Zoonoses, International Society for Chemotherapy, Aberdeen, UK; ³Municipal Centre of Hygiene, Epidemiology and Microbiology ‘Plaza’, La Habana, Cuba; ⁴Norwegian National Advisory Unit on Tropical Infectious Diseases, Department of Medicine, Haukeland University Hospital, Bergen, Norway; ⁵Department of Clinical Science, Faculty of Medicine, University of Bergen, Bergen, Norway; ⁶Institute of Infectious Diseases ‘Emilio Ribas’, São Paulo, Brazil; ⁷Research group Public Health and infection, Faculty of Health Sciences, Universidad Tecnológica de Pereira (UTP), Pereira, Risaralda, Colombia; ⁸Central Clinic ‘Cira García’, La Habana, Cuba and ⁹Academic Clinical and Surgical Hospital ‘Calixto García’, La Habana, Cuba

Abstract

Although *Giardia*, the aetiological agent of giardiasis, is one of the most prevalent intestinal parasitic infections world-wide, for industrialised countries, it is mainly appreciated as an imported disease with the minimal local transmission. However, the current evidence challenges this perception; *Giardia* has relevance beyond the high prevalence areas. This infection may be asymptomatic or cause gastrointestinal complaints and long-term sequelae, including irritable bowel syndrome, chronic fatigue and impaired child growth and cognitive development. Its detection and diagnosis present a challenge to physicians who may not be familiar with this infection. To improve interventions to control this parasitosis, it is necessary to maintain a high index of suspicion and remain vigilant in finding cases at risk for infection. A better understanding of the characteristics of populations importing infections alongside improved methods to reliably classify infections as imported or acquired locally will help to ensure early and accurate diagnosis. The evidence shows that public health problems like giardiasis are global issues that need to be addressed collectively by both high and low prevalence countries.

We welcome the paper by Currie *et al.* [1], in which they emphasise the need for significant improvements around *Giardia* selection criteria and testing algorithms in their country and at international level. Their work is a valuable example which alerts readers about the necessity of considering *Giardia* infection also in low-prevalence settings.

Giardia is estimated to cause annually 184 million clinical cases [2] and an associated 171 100 (115 777–257 315) disability-adjusted life years [3]. In industrialised countries, where the incidence of human giardiasis, the disease that *Giardia* causes, decreased after improvements of sanitary infrastructures and safe drinking water, it is seen to be principally associated with travelling to – or immigration from – endemic areas. As highlighted by Currie *et al.* many reports are challenging this perception [4–12]. Indeed, this disease is being increasingly considered as a re-emerging disease because of its recognised role in numerous outbreaks of diarrhoeal diseases in daycare centres and also due to water-borne associated outbreaks [13]. In industrialised countries, there are also deprived communities and groups in the population exposed to suboptimal hygienic conditions, placing them at increased risk of diarrhoeal disease [5, 8, 9]. This facilitates human to human transmission and also allows travel-acquired *Giardia* to spread more easily within these countries, a mechanism termed introduced autochthonous transmission. The routes of transmission are responsible for a substantial proportion of both diagnosed and undiagnosed giardiasis cases. For instance, in Germany, of 273 interviewed cases of giardiasis, 131 (48%) of cases were not associated with travelling abroad [6]. Additionally, untreated drinking water has been identified as a risk factor for sporadic giardiasis in New Zealand [14]. Swallowing water while swimming in pools, recreational fresh water contact, drinking treated tap water and eating lettuce had positive and independent associations with infection in a case-control study carried out in residents who had not recently travelled outside the UK [4], pointing out the possibility that even treated tap water is a source of sporadic giardiasis. Recently, Adam *et al.* analysed data on all giardiasis outbreaks reported to the US Centres for Disease Control and Prevention for 1971–2011, describing and highlighting the ability of this protozoan to cause outbreaks through multiple transmission routes [11], including waterborne (74.8%), foodborne (15.7%), person-to-person (2.5%), animal contact

(1.2%) and unknown ($n = 14$, 5.8%) transmission. Transmission from ill children to household contacts has also been documented in outbreak investigations [15] and sexual activity, mainly in men who have sex with men, which results in faecal–oral contact can lead to transmission of *Giardia* [16].

There are several factors hampering the rapid diagnosis of *Giardia* infection in industrialised countries. Firstly, as in developing countries, a large proportion of infected people do not develop symptoms but may shed *Giardia* cysts for a period of time [17, 18]. Secondly, in individuals who do develop symptoms, detection depends on clinical experience, technical skills and on available diagnostic resources [19]. These may vary widely between and within countries. Giardiasis may, therefore, go undiagnosed or may be treated inappropriately by physicians who are unfamiliar with this disease. According to a few studies carried out in developed countries [20, 21], physicians who see *Giardia*-infected individuals often lack the experience and awareness of the disease. For example, the American College of Obstetricians and Gynecologists in collaboration with the Centres for Disease Control and Prevention made a survey of obstetrician-gynecologists on their clinical and epidemiologic knowledge of giardiasis in pregnancy [20]. Good general knowledge about diagnosis, transmission and prevention was found. However, difficulties concerning the best way to treat this parasitic infection during pregnancy were identified [20]. In a survey of US pediatricians evaluating their knowledge and perceptions on the treatment of giardiasis in children, only 10% indicated they would suspect parasites in a patient with diarrhoea lasting more than 1–2 weeks [21]. History and physical exam (83.9%) and duration of diarrhoea (74.4%) were the main clinical aspects for parasitic-induced infection, with about one-third (36.2%) only taking into account the possibility of intestinal parasites when all other possible causes had been ruled out. Other studies have shown that a significant number of patients with giardiasis had encounters with health professionals without the diagnosis being considered, given the frequently observed delay between the onset of illness and diagnosis [22–25]. Surprisingly, in one study, 10% of patients reported receiving drugs, such as ciprofloxacin, which is ineffective against this protozoan [25]. The discovery of *Giardia* as the cause of a large waterborne outbreak in Bergen, Norway was delayed due to no history of travel abroad among the many patients seeking medical care for diarrhoeal disease [24]. These scattered reports underline the need to enhance efforts to provide education among general practitioners and pediatricians to be aware of *Giardia* as a cause of indigenous cases of diarrhoea and on how best to diagnose and effectively treat them.

Additionally, faecal specimens are often not routinely requested from persons with diarrhoeal illnesses [26, 27]. If *Giardia* is suspected, the right specimen and specific tests must be ordered and sent to a laboratory where adequate diagnostic tools and skills are available [28]. For laboratory diagnosis, a morphological determination by microscopy is the most commonly used method [29], which is simple and fast. Unfortunately, it is less sensitive, requires multiple sample examinations and concentration procedures and needs to be performed by well-trained technicians. Additionally, as it requires multiple clinic visits, it may be associated with high rates of diagnostic drop-out. In some industrialised countries, innovative modern technology has replaced microscopy as a routine diagnostic tool; i.e. the use of multiplex polymerase chain reaction assays for the detection of *Giardia* and other gastrointestinal protozoan pathogens (that

could be simultaneously present) is particularly valuable. It assists in detecting the true prevalence of *Giardia* as well as earlier detection of outbreaks if performed on a broader array of patients with diarrhoea.

Finally, the awareness of the community is low. In one study caregivers of children with diarrhoea and more specifically persistent diarrhoea induced by *Giardia* showed that relatively low proportions of caregivers had heard of *Giardia* (36%) [30].

There are important reasons to pay attention to under-diagnosis of *Giardia* infection. In some cases, *Giardia* can cause severe clinical manifestations such as acute and chronic diarrhoea (the latter defined in case of episodes lasting more than 4 weeks) [31]. This infection may also be accompanied with or without malabsorption, abdominal cramps, nausea, vomiting, increased flatulence and weight loss [32]. Additionally, a range of extra-intestinal manifestations and long-term consequences have been identified and associated with this protozoan infection [33]. A controlled prospective study of a cohort of individuals who had confirmed *Giardia* infection during a waterborne outbreak found a significantly increased risk for post-infectious irritable bowel syndrome and chronic fatigue even 6 years after the infection [34]. Of interest in both high and low prevalence settings, two recent studies have shown that early exposure to- or persistent *Giardia* infection during first 6 months of life, even if asymptomatic, contribute to increased intestinal permeability and to stunted growth at 2 years of age [35, 36].

The changing perspectives of the incidence and prevalence of giardiasis in industrialised countries, where it is still relatively neglected and underappreciated by practicing clinicians and maybe by caregivers, need to be taken into account. Giardiasis may exceed the current prevalence estimates. An increased awareness for indigenous transmission is hoped for and as a result, indications for *Giardia* testing would not be only done in returning travellers, nor considered only in a chronic diarrhoeal disease context. This might avoid delays in diagnosis.

Currie *et al.* [1] study reminds us that there are multiple potential areas for improvement in laboratory testing algorithms and diagnostic awareness of giardiasis. The evidence shows that public health problems like giardiasis are a global issue that needs to be addressed collectively by industrialised and developing countries. This protozoan disease, as well as other enteric parasites, should be considered more often in the differential diagnosis. It should be on the clinical, epidemiological and public health agenda, to be carefully addressed, for better decision-making in public health policies. It is especially important to keep in mind that, as in most infectious diseases, ‘what goes around, comes around’.

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