



Review

Sexual transmission of giardiasis: A neglected route of spread?



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ABSTRACT

Sexually transmitted infections (STIs) are often discussed in the context of syphilis, gonorrhoea, herpes, chlamydia and AIDS. However, since the past 30 years of the last century, epidemiology and natural history studies have led to improved understanding of giardiasis as a STI, as a result of oral–anal sexual contact. Studies suggest that *Giardia* is an increasingly recognized infection that may be underdiagnosed under the STI context. Health care providers should maintain a high index of suspicion for *Giardia*, obtain suitable diagnostic tests to identify and screen those at high risk for this infection, institute appropriate therapy, counsel patients regarding treatment compliance, follow-up, encourage partner notification and teach strategies for preventing the transmission of this disease, including the discussion of the risk of enteric infections after oral–anal sexual contact. We summarize some data concerning the research and clinical literature on *Giardia* infection as a STI and identify the specific recommendations for control of giardiasis as STI that available evidence indicates can reduce its transmission.

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1. Introduction

Sexually transmitted infections (STIs) have been a topic of great concern for many years. The number of infectious agents recognized as being sexually transmitted is increasing. While the

majority is of bacterial or viral aetiology, several intestinal protozoan infections may also be transmitted by sexual activity. For these protozoan infections, the primary mode of spread is non-sexual in nature but the widest sense of sexual activities may result in faecal–oral contact which subsequently leads to transmission of these agents. One of these infections potentially transmitted by sexual contact is *Giardia lamblia* (*G. intestinalis* or *G. duodenalis*), the causative agent of human giardiasis. The diagnose of this protozoan disease is mainly considered by physicians based on risk factors such as the previous exposure to contaminated water, endemic location, and history of traveling to endemic location. However, to less extend in the STIs context.

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2. *Giardia* infection

G. lamblia is one of the most frequently pathogenic intestinal protozoa diagnosed world-wide, with rates of detection between 2 and 5% in industrialized countries and 20–30% in developing nations, mainly due to a lack of adequate sanitation and hygiene. Although, the prevalence of *Giardia* infection is lower in industrialized countries, it is considered a re-emerging disease because of its recognized role in numerous outbreaks of diarrhoeal disease in day-care centres and in waterborne, and to a lesser extent, food-borne epidemics (Escobedo et al., 2010).

Giardia, once considered a harmless commensal flagellated organism, has been mainly implicated – clinically – in two main epidemiological scenarios, namely: (1) diarrhoea in young children from developing countries and (2) sporadic, often water- or food-related outbreaks of self-limiting diarrhoea in otherwise healthy individuals, principally in industrialized countries (Escobedo et al., 2010). Additionally, the disease may be observed in travellers returning from endemic areas.

The reported prevalence of *Giardia* infection varies according to several factors: geographic area, study group, sensitivity of the diagnostic methods used, accessibility to medical care and whether or not reporting is required. In the USA, this protozoan is considered responsible for the hospitalisation of nearly 5000 people annually (Kramer et al., 1996) and in 2005, over 15,400 cases of giardiasis were reported making it the most frequent enteric parasitic disease in this area (Centers for Disease Control and Prevention, 2006). Similarly, in Denmark, Finland, Norway and Sweden the prevalence in asymptomatic and symptomatic human populations was estimated to be 3% (2.6–3.3) and 6% (5.3–6.3), respectively. It was also estimated that for each registered *Giardia* case, it can be expected to occur annually, per 100,000 inhabitants, an estimated 867 unregistered symptomatic cases in Finland, 634 in Norway, and 254 in Sweden (Hörman et al., 2004). In contrast, the burden of giardiasis differs widely in comparison to that of the developing world; i.e., Asia, Africa and Latin America. In these areas, about 200 million people have symptomatic giardiasis, with some 500,000 new cases reported each year. It is estimated that, by 2050, more than 50% of people in these regions will be living in urban and peri-urban conditions, many of them in shanty towns, where *Giardia* would be easily transmitted (World Health Organization, 1996).

Like virtually all enteric pathogens, it causes a wide range of clinical presentations ranging from asymptomatic shedding of giardial cysts or self-limiting trivial diarrhoea at one end of the spectrum and acute or chronic diarrhoea, with or without evident signs of malabsorption, abdominal cramps, nausea, vomiting, and weight loss at the other (Escobedo et al., 2010). Additionally, it is currently associated with asthenia (Almirall et al., 2013), chronic fatigue (Mørch et al., 2009), post-infectious irritable bowel syndrome (Hanevik et al., 2007).

3. Sexual practices and *Giardia* transmission

Giardia is transmitted by the faecal–oral route, either indirectly through contaminated water or food, or directly, from person-to-person. This protozoan has frequently been reported among men who have sex with men (MSM), and oral–anal sex has been associated with infection (Table 1).

During the last three decades of the past century, this protozoan was reported among MSM, suggesting transmission through homosexual contact and, in some cases, pointing out directly to anilingus contact (Meyers et al., 1977; Esfandiari et al., 1997). Additionally, the prevalence of this intestinal protozoan was increasingly recognized among populations of homosexual men compared with that in heterosexual controls by Schmerin et al. (1978). The study of

William et al. (1978) was a significant contribution to the knowledge of sexually transmitted enteric infections among MSM. Their analysis of intestinal protozoan infections in selected homosexual men attending a venereal disease clinic revealed that 12% of them were infected with *Giardia* and the presence of infection also correlated with a history of anilingus but not with place of birth, travel or history of symptoms. Phillips et al. also pointed out homosexuality and oral–anal sex as important risk factors for *G. lamblia* transmission (Phillips et al., 1981). A case–control study carried out in a sexually transmitted disease clinic of Copenhagen, Denmark, reported giardiasis in 13.8% of homosexuals compared with none infection in heterosexuals. The infection was also correlated with anilingus; travelling to endemic areas was of no obvious importance in this study either (Christophersen et al., 1988). By contrast with these studies, Ortega et al. (1984) assessed the prevalence of enteric protozoa among 150 male homosexual patients in a clinic in San Francisco and none specific sexual technique could be linked to the presence of intestinal protozoa. Similarly, Pakianathan and McMillan (1999) did not find correlation between oral–anal sex or peno-insertive or peno-receptive anal intercourse and the prevalence of protozoa either. These controversial results could find explanation in the study of Phillips et al. (1981), who concluded that the “hyperendemic” enteric protozoan infection rates in MSM are related to three main factors: the original endemic level in the general population, the prevalence of sexual acts that facilitate transmission and the frequency of exposure to an infected person.

Nowadays, it could be acknowledged that, as in other transmission routes, several elements increase the possibility of sexual transmission of this protozoan. First, the high number of asymptomatic individuals; second, *Giardia* cysts survive the chemical barriers of the stomach and thrive in the duodenum; third, asymptomatic or subclinical, intermittent and long-term faecal shedding of cysts; fourth, the prolonged time of survival of cysts in the environment; fifth, the high cyst excretion rate from infected human host (150–20,000 cysts/g into faeces daily); sixth, cysts released in the faeces are immediately infectious; and seventh, the infectious dose is as low as 10 organisms (Escobedo et al., 2010). Taking these factors into account, it is reasonable to consider that even in the case of accidental ingestion of small amount of faecal matters during sexual activity; it could be delivered a sufficient inoculum to initiate the infection. Other behavioural factors such as the practice and frequency of anilingus, fellatio and/or digital–anal contact, particularly with shared penetrative sex toys, which their use seems to be common among gay and bisexual men during both solo and partnered sexual activities (Reece et al., 2010a; Rosenberger et al., 2012), could also influence transmission of this protozoan. There have been some studies reporting the use of sex toys among MSM (Perenboom, 2006; Turner et al., 2006) and lesbians (Kwakwa and Ghobrial 2003; Pinto et al., 2005; Marrazzo et al., 2005) with resultant STIs and HIV infection.

4. *Giardia* faecal–oral transmission and HIV/AIDS epidemics

Receiving a diagnosis of HIV is not synonymous with lack of sexual desire neither future celibacy (Parsons et al., 2003; Reisner et al., 2009), so HIV/AIDS awareness may have a side-effect on the transmission of *Giardia* infection and other enteric infections. Since the onset of the HIV epidemic, transmission of this virus through the oral route was considered a rare phenomenon. In fact, because of the perceived “relative safety” of oral sex compared to other types of sexual behaviour, unprotected oral sexual practices have been prevalent among many high-risk groups (Schwarcz et al., 1995). This increasing popularity of oral sex might be explained by its perception as a low-risk practice for conception or the acquisition of STIs including HIV infection (Rothenberg et al., 1998). In fact,

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