Intestinal parasitic infections: high prevalence of *Giardia intestinalis* in children living in an orphanage compared with hill-tribe children as detected by microscopy and ELISA

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**Background:** Data regarding intestinal parasitic infections in preschool-aged children (less than 6 years old) living in an orphanage and remote mountainous areas are very limited.

**Objectives:** We surveyed infections in orphans and hill-tribe children.

**Materials and Methods:** They were studied in 2008 by stool examination (simple smear and concentration), Scotch-tape and culture (Boeck and Drbohlav’s Lock-Egg-Serum medium) techniques. The *Giardia* copro-antigen ELISA was also performed. The risk correlation between unusual stool types and giardiasis by univariate analysis was tested.

**Results:** The overall infection rates in 137 orphans and in 145 hill-tribe children were 58.4% and 77.9%, respectively. *Giardia intestinalis* had the highest prevalence in orphans (with microscopy 28.5%, with copro-antigen ELISA 31.4%). Other pathogens included *Blastocystis hominis* (23.4%), *Enterobius vermicularis* (9.5%), and hookworm (0.7%), whereas the nonpathogens were *Trichomonas hominis* (19.0%), *Entamoeba coli* (11.7%), and *Endolimax nana* (2.2%). *Ascaris lumbricoides* had the highest prevalence (62.1%) in hill-tribe children, while *Giardia intestinalis* showed 7.6% with microscopy and 9.0% by ELISA. The other pathogens were *E. vermicularis* (25.5%), *Trichuris trichiura* (10.3%), *B. hominis* (2.8%), hookworm (1.4%), *Sarcocystis hominis* (1.4%) and *E. histolytica* (0.7%), whereas the nonpathogenic organisms were *E. coli* (19.3%), and *E. nana* (0.7%). Giardiasis stools from orphans had significantly greater cyst density than those from the hill-tribe children. The copro-antigen ELISA for giardiasis demonstrated 91.4% specificity, 72.0% sensitivity, 64.3% positive predictive value, and 93.8% negative predictive value, respectively. By univariate analysis, a loose (mushy) stool type was 2.43 times likely to have *Giardia* cysts.

**Conclusion:** In large-scale epidemiological studies, a *Giardia* ELISA might be a useful aid for diagnosis, because conventional microscopy is time-consuming and relies on the expertise of the microscopist.

**Keywords:** ELISA, *Giardia intestinalis*, hill-tribe children, intestinal parasite, microscopy, orphanage children, preschool-aged children

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*Giardia intestinalis* (also known as *Giardia duodenalis*; previously, *Giardia lamblia*) is a ubiquitous, water-borne diarrhea-causing protozoan, commonly found in children worldwide. Giardiasis is transmitted through the consumption of parasite cysts in contaminated drinking water and less often in food. The parasite can infect both humans and animals, which include birds, reptiles, and mammals [1, 2]. Incidence of human infection worldwide is estimated at 280 million cases per year [3]. Although 60%–80% of infected people may be asymptomatic, those with symptoms may experience mild diarrhea, anorexia,