Study on *Giardia duodenalis* and *Cryptosporidium* spp. infection in veterinarians in Poland

Angelina Wójcik-Fatla¹,²,⁎, Jacek Sroka²,⁎, Violetta Zając¹,⁎, Jacek Zwoliński¹,⁎, Jacek Dutkiewicz¹,⁎, Angelina Wójcik-Fatla

¹ Institute of Rural Health, Lublin, Poland
² National Veterinary Research Institute, Puławy, Poland

A – Research concept and design, B – Collection and/or assembly of data, C – Data analysis and interpretation, D – Writing the article, E – Critical revision of the article, F – Final approval of article

Address for correspondence: Angelina Wójcik-Fatla, Institute of Rural Health, Lublin, Poland

INTRODUCTION

Cryptosporidiosis is a zoonosis that causes symptoms in both humans and animals [1]. It is a digestive tract invasion, and the source of infection may be an another person, food or water contaminated with parasite oocysts. Transmission of the parasite can also occur due to direct contact with infected animals. In humans, the most common species are *Cryptosporidium hominis* and *Cryptosporidium parvum*, which also cause infections in cattle, sheep and pigs [2]. Cryptosporidiosis symptoms in humans are persistent diarrhea, abdominal pain, vomiting and dehydration [3].

*Giardia duodenalis* is the most common intestinal parasite in humans. Worldwide, giardiasis occurs in 2–7% of the population, and in developing countries these numbers range from 20–30% [4, 5]. The infection occurs by consumption of *Giardia* cysts in contaminated water or food. In Poland, the presence of *Giardia* was found in surface waters (up to 61%) [6, 7] and sewage (up to 84.6%) [8]. The infection can also be acquired through direct contact with infected domestic and wild animals, such as cows, pigs, dogs, cats, sheep, goats, beavers, deer and foxes [9]. The course of giardiasis is often asymptomatic. In acute cases, diarrhea, abdominal pain, nausea, vomiting and dehydration occur. The parasite can be located in the small intestine and bile tracts, which may cause inflammation and obstruction.

MATERIALS AND METHOD

Two hundred and ninety-seven veterinarians working in district veterinary inspectorates and private veterinary clinics located in 12 provinces of Poland were examined: 135 males (45.45%) and 162 females (54.55%); age range – ≤30 – ≥61. Each of the participants signed informed consent approved by the Bioethical Commission of the Institute of Rural Health (Permission No. 9/2017).

Stool samples were tested for the presence of *Giardia duodenalis* cysts and *Cryptosporidium* spp. oocysts using Direct Fluorescent Assay (DFA). There were no positive results for *Cryptosporidium*. The presence of *Giardia* cysts was found in two samples of faeces (0.67%). The risk with regard to the parasites *Giardia duodenalis* and *Cryptosporidium* spp. seems to be low among the group of veterinarians.

RESULTS

Among 297 faecal samples tested, no positive results for *Cryptosporidium* spp. were obtained. In DFA, the presence of *Giardia* cysts was found in two samples (0.67%), from one male and one female, both aged over 61 (Fig. 1). According to the interviews by the veterinarians with positive results to *Giardia*, none of them reported clinical symptoms. Positive results were confirmed by PCR (Fig. 2). Sequencing confirmed amplification products as *Giardia duodenalis* assemblage A (sub-genotype A3).

DISCUSSION

To date in Poland, there have been only few cases of cryptosporidiosis (6 and 7 in 2016 and 2017, respectively) [11]. Many laboratories do not routinely test for *Cryptosporidium* in Poland, hence the incidence of the disease may be underestimated. Because the transmission risk to humans depends on the species or genotype of the parasite, the molecular...
characteristics of the isolates is necessary for the assessment of epidemiological risk [3]. Using the molecular methods, Benschop et al. [12] confirmed that 7 out of 156 veterinary science and veterinary technology students at Massey University in New Zealand were suffering from cryptosporidiosis. All 7 faecal specimens contained Cryptosporidium oocysts, whereas Cryptosporidium parvum IIA A18G3R1 was identified from one of the specimens. Much less is known about the risk of giardiasis among veterinarians and other occupational groups exposed to animal carriers. According to NIZP-PZH data, every year in Poland about 1,300 cases of giardiasis are recorded in humans [12], with the risk of giardiasis among children reaching 12.5% [13]. The negative results of diagnostic tests for Cryptosporidium spp. and small number of positive results for Giardia spp. could be the effect of increased awareness of veterinarians, and may be related to environmental studies focused on the occurrence of the above-mentioned pathogens. However, in literature, there are many examples of occupational exposure of veterinarians to these parasitic protozoans [14, 15, 16, 17], and for a comprehensive assessment regarding to occupational hazards in veterinarians Poland, further study with a larger group of participants are needed. The basic method of stool examination in the present study was DFA, PCR was used only to confirm the diagnosis. Hence, the presence of Cryptosporidium oocysts in a concentration below the limit of detection in DFA cannot be excluded.

Acknowledgements
This study was supported by the Ministry of Science and Higher Education/National Centre for Research and Development coordinated by Central Institute for Labour Protection – National Research Institute, Warsaw, Poland (Agreement No. TP-54/2017/PW-PB’, Project No. II.N.22: “Improving safety and working conditions”, 2017–2019).

Conflict of Interest Statement
The authors declare they have no conflicts of interest.

Ethical approval
All procedures performed in studies involving human participants were in accordance with the ethical standards approved by the Bioethical Commission of the Institute of Rural Health in Lublin (Permission No. 9/2017).

REFERENCES