BACKGROUND

• The highest incidence of self-reported enteric illness in the global literature is in the Canadian North.1

• Recent work has revealed high rates of Cryptosporidium and Giardia in the stools of enteric illness patients in the Qikiqtaruk region of Nunavut, with molecular analyses suggesting a potential animal or foodborne source of these pathogens.2

• In response, the People, Animals, Water, and Sustenance (PAWS) project was developed, which aims to understand, respond to, and reduce the burden of foodborne, waterborne, and zoonotic enteric pathogens in Northern locales.

• Following literature reviews and extensive stakeholder engagement, the PAWS project is using EcoHealth principles to examine Cryptosporidium and Giardia in country food, drinking water, and pets as potential sources of illness in humans.

• Locally harvested country foods provide nutrition and a sense of cultural continuity in Inuit communities.3

• Clams are a commonly consumed and easily accessible country food, but can accumulate parasites from surrounding waters.4

GOALS

• The goal of this work is to better understand clams as a potential source of cryptosporidiosis and giardiasis in Iqaluit, Nunavut.

• The objectives were to:
  1. Estimate prevalence;
  2. Identify risk factors;
  3. Genetically characterize Cryptosporidium and Giardia in clams from Iqaluit for analysis.

METHODS

• Clams were collected from local harvesters in exchange for small gifts in September 2016 over a peak clam harvesting weekend, and location of clam harvest was recorded.

• Hemolymph (circulatory fluid) and digestive gland samples from each clam were tested for Cryptosporidium and Giardia.

• Initial screening was performed by PCR targeting 18S and gdh genes of Cryptosporidium and Giardia, respectively.

• Suspected positive PCR amplicons were confirmed using sequence analyses.

RESULTS

• Clams (n=404) were collected from local harvesters in September 2016; hemolymph was sampled from 326 clams and digestive gland was sampled from 390 clams.

• Following sequence analyses, 2 clam hemolymph samples (0.51%) were confirmed positive for Giardia duodenalis Assemblage B, and no clams were confirmed positive for Cryptosporidium (Figure 1).

• Both Giardia sequences from clams contained 2 single nucleotide polymorphisms (SNPs) which distinguished them from each other, from Giardia sequences in GenBank, and from the Giardia used as a positive control.

CONSIDERATIONS

• The presence of Giardia in clams harvested near Iqaluit indicates potential contamination of coastal waters with fecal material from humans or animals.

• The Giardia found in clams was identified as Assemblage B, which is zoonotic and may cause illness in people and animals who consume infectious Giardia cysts.6

• The PCR methods used in this study provide information on the presence of DNA consistent with Giardia, but not on the infectivity of the detected parasites.4,5

• The clams in this study were collected from harvesters over one major harvesting weekend; and temporal differences in parasite prevalence could not be evaluated.

• The limits of detection for both PCR assays are 10-100 (oo)cysts;7 and clams containing few oocysts may have been missed.

• Results from this study are intended to inform public health messaging in Iqaluit, Nunavut, and other Indigenous communities in Northern Canada.

• This project contributes to a larger, ArcticNet-funded study which is working closely with Northern organizations to create a participatory, community-based surveillance system to understand, respond to, and reduce the burden of foodborne, waterborne, and zoonotic enteric pathogens in Northern locales.

ACKNOWLEDGEMENTS

Many thanks to Gary Akpik, Puullis Dorval, Makirin Naukkuk, Mary Kabaak, Lynda Green, Stephanie Massie, Danielle Julian, the Nunavut Research Institute, the Government of Nunavut Fisheries and Sealing Division, Qaggiavik Public Health, and the Iqaluit community for all their help and support. Thanks as well to Beatrice Aguilar and Brittany Daley for their help in processing clams at the UC Davis laboratory, and to Rebecca Ang and Joyce Rousseau for their help in processing clams at the University of Guelph.