Enteric infections among symptomatic and asymptomatic preschool-age children in Nunavik: Interim results from a prospective cohort study

Harry Kim1*, David Goldfarb2, Elizabeth Serra1, Chelsea Caya1, Koray Demir1, Lydia Audlaluk3, Jean-Francois Proulx4, Cedric P Yansouni1

1McGill University Health Centre, Montreal, Canada  2University of British Columbia, Vancouver, Canada  3Concordia University, Montreal, Canada  4Nunavik Regional Board of Health and Social Services (NRBHSS), Quebec, Canada

Abstract

Background: Human infections with intestinal parasites, particularly from Cryptosporidium, are recently recognized as being highly prevalent among people with diarrhea in parts of the Arctic. However, data are lacking about their transmission among asymptomatic community members as a potential reservoir of endemity. This is important because cryptosporidiosis has been repeatedly associated with impaired growth and development in children, and may synergize with other challenges faced by remote Arctic communities, such as overcrowding and food insecurity.

Method/Study design: A prospective cohort of daycare-attending children (age <5 years) in Kuujjuaq, Nunavik, was assembled in collaboration with community stakeholders. Stool specimens and anthropometric data were collected every 4 months, and a questionnaire was administered to parents asking about diarrhea symptoms. Stool specimens were stored frozen until testing with a previously validated multiplex polymerase chain reaction (PCR) assay that detects 22 enteropathogen targets (13 bacteria, 4 protozoan parasites, and 5 viruses) simultaneously (BioFire FilmArray™ Gastrointestinal panel; bioMérieux Inc.).

Results: We present results of an interim analysis of the first 8 months of serial data collection on the causative spectrum of enteric infections in young children from a 2-year prospective cohort study.

Hypothesis & Objective

Hypothesis: Notifiable enteric infections are common and may contribute to stunting in young children in Canadian Arctic communities.

Objectives: (i) To assess the frequency and etiologic spectrum of intestinal pathogens circulating among daycare-attendees in Nunavik. (ii) To determine the incidence of diarrhea in this group, and (iii) to determine whether enteropathogens are associated with diarrhea.

Enteropathogens and Diarrhea

- Multiplicity of risk factors:
  - Possible food insecurity
  - Home overcrowding
  - Limited access to health services
  - Geographical isolation and difficulty of travel
  - Indigenous communities facing severe socio-economic challenges

Health in Northern Canada

Diarrhea and Food Security Questionnaire

- 15-minute phone interviews with enrolled children's parents
  - Frequency of diarrhea
  - Food security

Data Collection

Stool and Anthropometry data collection

- Soiled diapers and bulk stool samples collected from daycares
- Samples processed at the Kuujjuaq Ungava Tulattavik Health Centre
- Stored at -80°C until analysis

Parents

Study Design

Preliminary Results at 8 Months (2 Collections):

Microbiology

Profile of Enteric Pathogens in Kuujjuaq Daycares

- 9 EPEC
- 3 EAEC
- 1 ETEC LT/ST
- 1 Campylobacter
- 1 C. difficile
- 1 Giardia lamblia
- 18 NEGATIVE
- 2 DP

- No Cryptosporidium detected.
- Few notifiable infections (2/32 children)
- EPEC is highly prevalent (9/32 children)

Diarrhea Questionnaire

- 16/53 (30.2%) children reported vomiting/diarrhea during study period
- Preliminary data so far precludes correlation of diarrhea symptoms to infection

Food Security

- In the last 12 months, did you or other adults in your household ever run out for a whole day because there wasn't enough money for food?
- In the last 12 months, were you ever hungry but didn't eat because you couldn't afford enough food?
- In the last 12 months, did you or other adults in your household ever run out for a whole day because there wasn't enough money to buy food?

What next?

- Continue recruitment of children in daycares
- Build a complete dataset

References


Acknowledgements

- Parents and Members of the local Board of Directors for Kuujjuaq and Tuniapiit Daycares for their engagement and support
- Members of the Kuujjuaq Ungava Tulattavik Health Centre Laboratory
- Members of the Inuktitut Hospital General Laboratory