COACTION

Untreated water and *Helicobacter pylori*: perceptions and behaviors in a Northern Canadian community

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*H**elicobacter pylori* is a Gram-negative bacteria that infect the lining of the stomach and/or duodenum, and it has been linked to the development of gastric cancer. While a decline in prevalence has been observed in major urban centers across Canada (1), Aboriginal populations continue to experience an elevated frequency of the infection (1).

Since the only known source of *H. pylori* is the human stomach, transmission is thought to occur, at least in part, through contact with infectious fluids from the digestive tract (2). The relative frequency of transmission through different types of bodily fluid is unclear. The question of additional sources of the bacteria, including environmental reservoirs, has been unanswered to date.

Among residents of Aklavik, NT, and Old Crow, YT, who participated in CAN*Help* Working Group *H. pylori* Projects, some thought water to be a source of *H. pylori*, and noted this as a reason for community concern. This cross-sectional analysis aims to estimate the proportion of residents of these communities who suspect water as responsible for *H. pylori* transmission and investigate whether this view affects their consumption of untreated water.

Methods

Data on demographics, frequency of drinking untreated river water and ideas about *H. pylori* transmission were collected in structured interviews as part of community-based, participatory research projects conducted in Aklavik, NT, and Old Crow, YT, during 2008–2011.

Mixed effects logistic regression models, accounting for random effects of household clustering and fixed effects of community clustering, were used to estimate odds ratios (OR) and 95% confidence intervals (CI) for associations between the idea that *H. pylori* is transmitted through water and untreated water consumption behavior. Control variables were selected for the final model

if the OR of the exposure of interest (water perceptions) changed >10% when the variable was removed from a model containing all candidate control variables. All analyses were conducted using STATA12.

Results

The proportion of participants who in the past 12 months had consumed water that was not treated at a water treatment plant was 40% (151/375). Of these individuals, 34% (51/151) reported consuming water directly from the river/lake without using any method to treat the water, including boiling or filtering. When asked about lifetime consumption of untreated water, 73% (285/389) of participants reported consuming untreated water in their lifetime.

When asked their opinion on how people get *H. pylori*, 27% of respondents reported thinking people can get the infection from water. A total of 292 participants had complete data on water consumption, ideas about transmission of *H. pylori* and demographic characteristics. Residents of Old Crow had much higher odds (OR adjusted for household clustering only, 6.0; 95% CI: 2.7, 13) of consuming river or lake water in the past year compared to residents of Aklavik (Table I). Individuals who suspected water as a source of *H. pylori* had 2.3 (95% CI: 1.0, 5.2) times the odds of consuming river/lake water in the past year compared to those who did not mention water, when adjusting only for clustering in households. The magnitude of the observed association between suspecting water as a source of *H. pylori* and water consumption behavior was greatly reduced following adjustment for community, education and age.

Discussion

The role of water in the transmission of *H. pylori* remains uncertain due to technical difficulties in detecting living *H. pylori* organisms in water. While science is currently

Table I. Predictors of river/lake water consumption in the past 12 months. Sex and Aboriginal status were not significant predictors of untreated water consumption and were not included in the third model

	Adjusted for household (random effect)		Adjusted for household (random effect) and community (fixed effect)		Adjusted for household (random effect), community, education and age (fixed effects)	
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
How people get *H. pylori*						
Did not mention water as a source (n = 215)	1.0		1.0		1.0	
Mentioned water as a source (n = 77)	2.3	(1.0, 5.2)	1.5	(0.64, 3.3)	1.3	(0.57, 2.9)
Community						
Aklavik (n = 255)	1.0				1.0	
Old Crow (n = 37)	6.0	(2.7, 13)	–	–	12	(3.6, 43)
Education						
Less than 12 years (n = 182)	1.0		1.0		1.0	
12 years or more (n = 110)	1.0	(0.52, 1.9)	0.67	(0.35, 1.3)	0.42	(0.19, 0.92)
Age						
Adult (20–49 yrs) (n = 140)	1.0		1.0		1.0	
Child/youth (0–19 yrs) (n = 67)	0.51	(0.23, 1.1)	0.62	(0.29, 1.4)	0.53	(0.23, 1.3)
Elder (≥50 years) (n = 85)	0.59	(0.29, 1.2)	0.56	(0.28, 1.1)	0.51	(0.23, 1.1)
Sex						
Male (n = 131)	1.0		1.0			
Female (n = 161)	0.70	(0.39, 1.3)	0.75	(0.43, 1.3)	–	–
Aboriginal						
Non-Aboriginal (n = 33)	1.0		1.0			
Aboriginal (n = 259)	1.1	(0.37, 3.2)	1.2	(0.44, 3.4)	–	–

unable to confirm or refute waterborne transmission of *H. pylori*, a large proportion of residents of Aklavik and Old Crow suspect that contamination of local water sources exposes the community to *H. pylori*. This idea may be due in part to core community values that recognize the interconnectedness of human and environmental health (3).

A high percentage of individuals reported consuming untreated water in the past year, a practice associated with local traditions. Many residents of these communities follow a traditional lifestyle of hunting, trapping and fishing. This often entails living on the land for extended periods, during which time drinking directly from natural bodies of water is routine.

None of the estimates from these analyses indicated that people who hold the belief that *H. pylori* are in the water were less likely to drink untreated water. It should be noted, however, that we did not ascertain which community water sources people believed to be contaminated with *H. pylori*. It is possible that there is a higher level of trust in the quality of natural water bodies than there is in the quality of locally treated water delivered to residents by truck and stored in household water tanks.

Conclusion

A substantial proportion of Aklavik and Old Crow residents suspect water as a source of *H. pylori* infection. Consumption of untreated river water is widespread in these communities. Findings from these analyses do not reveal an association between suspecting water as a source of *H. pylori* and frequency of drinking untreated water.

References

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