Outbreak of *Cryptosporidium* linked to drinking unpasteurised milk

Catherine M Harper,[1] Noel A Cowell,[2] Brad C Adams,[2] Andrew J Langley,[2] Tracey D Wohlsen[3]

In August and September 2001, the Sunshine Coast Public Health Unit received notifications that 8 children from the Sunshine Coast, Queensland, had laboratory-confirmed *Cryptosporidium* in faecal samples. Four children were hospitalised and all recovered. Dates of onset were consistent with a protracted common source dispersed in the community. An epidemiological and environmental investigation sought details of symptom history and exposure to potential sources of *Cryptosporidium*, including animal contact, commercial and non-commercially available unpasteurised milk, non-potable water and other persons with gastroenteritis. For the case control study, a case was defined as a child with laboratory-confirmed *Cryptosporidium*, with symptom onset in August 2001 and living on the Sunshine Coast. Considering the potential confounders of age and geographic location, substantial effort was made to obtain age-matched controls from the treating general practitioner. Controls had attended the general practitioner for conditions other than gastroenteritis. Controls for 3 cases were unable to be obtained, and thus only unmatched analysis was undertaken.

All 8 cases experienced vomiting and diarrhoea. Three controls (18%) had diarrhoea and two had vomiting (12%) in August 2001, with no laboratory confirmation of cause. The incubation period was available for 6 cases only, where a range of one to 9 days was recorded.

Unmatched analysis was performed using SPSS v10.07. Drinking of commercially obtained unpasteurised milk in the 2 weeks prior to the onset of illness was the only exposure significantly associated with a laboratory-confirmed diagnosis of *Cryptosporidium* (Table). For this exposure the Odds Ratio (OR) was 32.7, and 95 per cent confidence interval (CI) 2.9-374.

Table. Exposure history and odds ratios

Exposure in 2 weeks prior to onset	Cases exposed (n=8)	Controls exposed (n=17)	OR	95%CI
Unpasteurised milk	7	3	32.7	2.9-374
Contact with farm animals, zoo animals or animal sanctuaries	2	5	0.80	0.11-5.7
Contact with pets	8	15	2.74	0.1-64*
Contact with pets with diarrhoea	0	0	No exposure	
Swimming in lake, dam, or private or public pool	4	3	6.2	0.89-44
Pasteurised milk	6	15	1.25	0.05-35*
Milk direct from a farm	0	1	0.85	0.03-24*
Purchased water or water from a tank	4	10	0.7	0.13-3.8
Contact with people with gastrointestinal symptoms	5	8	2.2	0.3-15

* Estimated OR (95% CI). Estimation was required as all cases were exposed to pets and to pasteurised milk and none were exposed to milk directly from a farm. The OR and 95 per cent CI were estimated by adding 0.5 to each cell frequency.

1. Catherine M Harper, Senior Epidemiologist, Central Public Health Unit, Network — Brisbane Northside, Public Health Services, Queensland Health, Fortitude Valley QLD.
2. Central Public Health Unit Network — Sunshine Coast, Public Health Services, Queensland Health, Maroochydore QLD.
3. Public Health Microbiology, Queensland Health Pathology and Scientific Services, Archerfield QLD.

Corresponding author: Ms Catherine M Harper, Senior Epidemiologist, Central Public Health Unit Network — Brisbane Northside, Public Health Services, Queensland Health, PO Box 1507, Fortitude Valley QLD 4006. Telephone: +61 7 3250 8602. Facsimile: +61 7 3250 8595. E-mail: Catherine_Harper@health.qld.gov.au.

All 10 samples of the commercial product of unpasteurised milk were found to be of unacceptable quality for unpasteurised milk (Food Standards Code 1.6.1), due to a high plate, coliform and/or *E. coli* counts. Milk samples were mixed with equal volumes of distilled water and Tween-20, centrifuged at 1000 x G.[1] A cream layer (approx. 1mL) was present after centrifugation. Both the cream layer and the pellet were further concentrated using immunomagnetic separation and stained using an immunofluorescent reagent containing *Cryptosporidium*-specific monoclonal IgG1 antibodies. Concentrated samples were examined microscopically and analysed using the ELISA SYSTEMS™ *Cryptosporidium* Detection in Water Microwell ELISA kit.[2] Five samples returned positive results for *Cryptosporidium* antigen in the milk fat. In addition, the single available sample of unconsumed commercial unpasteurised milk obtained from a case tested positive for the antigen. The detection level for the ELISA kit, as stated by the manufacturer, is 10 oocysts per well and/or 30 nanograms per mL of concentrated *Cryptosporidium* antigen. Two negative control samples were also analysed, a pasteurised commercially available milk sample and an unpasteurised milk sample from a local dairy supplier.

This is the first reported outbreak of cryptosporidiosis associated with drinking unpasteurised cow milk in Australia. A single report from the United Kingdom describes an outbreak in children when the pasteurisation process was faulty[3] and a mother and child are believed to have been infected by unpasteurised goat milk in Australia.[4] It is illegal to sell unpasteurised cow milk for human consumption in Queensland. This milk was labelled as unpasteurised pet milk. This outbreak illustrates the dangers associated with drinking unpasteurised milk. Calves are frequently infected with *Cryptosporidium,*[5] oocysts can be recovered from adult cows and milk can be contaminated through mechanisms such as poor udder hygiene. Cryptosporidial oocysts will not survive pasteurisation.[6]

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