Risk factors leading to *Cryptosporidium* infection in men who have sex with men

M Hellard, J Hocking, J Willis, G Dore, C Fairley

**Objectives:** *Cryptosporidiosis* is a devastating illness in people with HIV/AIDS yet there have been no analytical epidemiological studies measuring risk factors leading to *cryptosporidiosis* in men who have sex with men (MSM). The objective of this study was to measure the risk factors for exposure to *Cryptosporidium* among MSM.

**Methods:** The study was a case-control design. It recruited MSM who had laboratory confirmed *Cryptosporidium* infection between 1997 and 2000. Participants answered a questionnaire about potential risk factors leading to exposure to *Cryptosporidium*.

**Results:** 10 cases and 24 controls were recruited. Men having more than one sexual partner in the past month were more likely to have had *Cryptosporidium* diarrhoea (p = 0.034 (OR 6.67 CI (1.15 to 38.60). Insertive anal sex (p = 0.059) and attending a sex venue one or more times (p = 0.059) also increased the odds of having *cryptosporidiosis*.

**Conclusion:** The study results suggest that sexual behaviour is a significant risk factor for *cryptosporidial diarrhoea* in MSM. The results will be used to inform risk groups about behaviours that may put them at increased risk of *cryptosporidial diarrhoea*.

*Cryptosporidium* was first identified in 1907 but cases of disease in humans were not described until 1976. During the late 1970s and early 1980s further cases were recognised in immunocompromised patients, in particular in AIDS patients. By the early 1990s *Cryptosporidium* was recognised as an important cause of community gastroenteritis caused by outbreaks associated with drinking water, swimming pools, and animal exposure. In the general community *cryptosporidial diarrhoea* is usually a self limiting gastrointestinal lasting 1–2 weeks.

*Cryptosporidiosis* can be a devastating illness in people with HIV/AIDS because it can cause severe diarrhoea that lasts for weeks and has a significant impact on patients’ morbidity and mortality. In the absence of effective therapy or response to highly active antiretroviral therapy (HAART), preventing exposure to *Cryptosporidium* organisms offers an alternative approach. In Australia the primary risk factor for HIV infection is male to male sexual contact and it is this subgroup who are at most risk of contracting cryptosporidiosis. Sexual contact has been implicated as a possible risk factor but there have been no analytical epidemiological studies measuring risk factors leading to cryptosporidiosis in men who have sex with men (MSM).

We report the results of a case-control study that aimed to identify the risk factors for exposure to *Cryptosporidium* among MSM. If the risk factors can be identified this helps in advising people about how they can reduce their risk of contracting cryptosporidiosis, particularly MSM with HIV/AIDS.

**METHODS**

The study was a case-control design. It recruited MSM in both Melbourne and Sydney who had laboratory confirmed *Cryptosporidium* infection between 1997 and 2000. Cases were identified through hospitals or general practices that had a large case load of HIV infected men. Cases were also identified through a larger community study of *Cryptosporidium*. When a case occurred at a practice known to have a high case load of MSM the general practitioner was contacted. If the patient met the study criteria (being an MSM and having a confirmed case of *Cryptosporidium* infection) they were invited to participate in the study. Up to three controls for each case were recruited from the same hospital or general practice that the case attended. They were the next known MSM seen at the practice after the case was identified who had the same HIV status.

Participants self completed a questionnaire that recorded HIV status, drinking water consumption, sexual behaviour, use of sex on premises venues, use of swimming pools, travel, if they were a carer for an HIV positive person, and exposure to children and animals in the month before the participant developing cryptosporidiosis. The cases were compared with MSM who did not have cryptosporidiosis.

*Cryptosporidium* is a notifiable disease in New South Wales, the state in which the city of Sydney is located. *Cryptosporidium* was not officially a notifiable disease in Victoria, the state in which the city of Melbourne is located, but for all practical purposes was being treated as such by the Department of Human Services. It is now officially a notifiable disease in Victoria. Testing for *Cryptosporidium* varied between the laboratories but generally a modified acid stain or an immunofluorescence assay was used. All analysis is based on an unmatched case-control study and was conducted using STATA version 7. Owing to the small number of cases no adjusted analysis was performed. Local institutional research and ethics committees approved the study. Study participants gave their written and informed consent.

**RESULTS**

Ten cases and 24 controls were recruited between October 1998 and August 2000. Seven cases (70%) and 16 (66.66%) controls were HIV positive. The mean CD4 count was $320 \times 10^6/\mu l$ for cases and 336 for controls.

Men having more than one sexual partner in the past month were nearly seven times more likely to have had *Cryptosporidium* diarrhoea ($p = 0.034$ (OR 6.67 CI (1.15 to 38.60). The odds of cryptosporidiosis were increased among those who had insertive anal sex in the past month and among those who had been to a sex venue one or more times ($p = 0.059$ for each variable) (table 1). There was no
significant association between drinking tap water (p = 0.71) or contact with pets (p = 0.46).

**DISCUSSION**

Our study results suggest that sexual behaviour is a significant risk factor for cryptosporidial diarrhoea in MSM. This is the first case-control study to report this direct association. Previous studies of people infected with HIV have suggested a relation between cryptosporidiosis and sexual activity in MSM compared with injecting drug users or other HIV subgroups but none looked at specific risk factors in MSM. Our study found that having more than one sexual partner in the past month increased the risk of cryptosporidial diarrhoea. The odds were also increased among those who had anal insertive sex and attended a sex venue in the past month but the limited power of the study made it difficult for variables to reach statistical significance.

The number of case of initial AIDS defining cryptosporidiosis in MSM. Our study results suggest that sexual behaviour is a significant association between drinking tap water (p = 0.71) or contact with pets (p = 0.46).

Cryptosporidial diarrhoea remains an intractable problem in HIV infected patients with low CD4 counts who do not respond to HAART. There is also the concern that as patients develop resistance to antiretroviral therapy there may an increase in opportunistic infections such as *Cryptosporidium*. For this reason it is important that we understand the major risk factors leading to *Cryptosporidium* infection and educate patients about how to avoid contracting this infection.

**ACKNOWLEDGEMENTS**

We thank Ms Pam Lightbody Department of Epidemiology and Preventive Medicine; Dr Leena Gupta Central Sydney Public Health Unit; Dr Mark Ferson South East Sydney Public Health Unit; the general practitioners at the Carlton Clinic, Middle Park Clinic, and Prahran Market Clinic in Melbourne; and study participants.

**CONTRIBUTORS**

MH, development of the grant proposal and study methodology and protocol and recruitment of participants, managed the project and contributed to the writing of the manuscript; JW performed the statistical analysis and contributed to the writing of the manuscript; GD assisted in writing the study protocol and ethics submissions, recruited and interviewed study participants, performed data entry and contributed to the writing of the manuscript; GD, development of the study methodology, recruitment of the study participants and contributed to the writing of the manuscript; CF, development of the grant proposal and study methodology, recruitment of participants, and contributed to the writing of the manuscript.

**Funding:** National Health and Medical Research Council.

**Authors’ affiliations**

M Hellard, J Willis, C Fairley, Department of Epidemiology and Preventive Medicine, Monash University, Melbourne, Australia.

M Hellard, J Hocking, Macarlan Burnet Institute for Medical Research and Public Health, Melbourne, Australia.

G Dore, National Centre in HIV Epidemiology and Clinical Research, The University of New South Wales, Sydney, Australia.

C Fairley, Department of Public Health, University of Melbourne, Melbourne, Australia.

Correspondence to: Dr Margaret Hellard, Department of Epidemiology and Preventive Medicine, Monash Medical School, Alfred Hospital, Commercial Road, Melbourne, 3004, Australia; margaret.hellard@med.monash.edu.au

Accepted for publication 14 April 2003
REFERENCES

Risk factors leading to *Cryptosporidium* infection in men who have sex with men

M Hellard, J Hocking, J Willis, G Dore and C Fairley

*Sex Transm Infect* 2003 79: 412-414
doi: 10.1136/sti.79.5.412

Updated information and services can be found at: [http://sti.bmj.com/content/79/5/412](http://sti.bmj.com/content/79/5/412)

These include:

**References**
This article cites 6 articles, 0 of which you can access for free at: [http://sti.bmj.com/content/79/5/412#BIBL](http://sti.bmj.com/content/79/5/412#BIBL)

**Email alerting service**
Receive free email alerts when new articles cite this article. Sign up in the box at the top right corner of the online article.

**Topic Collections**
Articles on similar topics can be found in the following collections

- Drugs: infectious diseases (3182)
- Epidemiologic studies (760)
- Health education (960)
- HIV / AIDS (2514)
- HIV infections (2514)
- HIV/AIDS (2514)

**Notes**

To request permissions go to: [http://group.bmj.com/group/rights-licensing/permissions](http://group.bmj.com/group/rights-licensing/permissions)

To order reprints go to: [http://journals.bmj.com/cgi/reprintform](http://journals.bmj.com/cgi/reprintform)

To subscribe to BMJ go to: [http://group.bmj.com/subscribe/](http://group.bmj.com/subscribe/)