



Archivos de Medicina Veterinaria

ISSN: 0301-732X

archmv@uach.cl

Universidad Austral de Chile

Chile

FERNANDEZ, H.; OTTH, L.; WILSON, M.

Isolation of thermotolerant species of *Campylobacter* from river water using two collection methods

Archivos de Medicina Veterinaria, vol. 35, núm. 1, enero, 2003, pp. 95-97

Universidad Austral de Chile

Valdivia, Chile

Available in: <http://www.redalyc.org/articulo.oa?id=173013742010>

- How to cite
- Complete issue
- More information about this article
- Journal's homepage in redalyc.org

redalyc.org

Scientific Information System

Network of Scientific Journals from Latin America, the Caribbean, Spain and Portugal

Non-profit academic project, developed under the open access initiative



## Archivos de medicina veterinaria

ISSN 0301-732X *versión impresa*

 [Texto completo PDF](#)

 [Como citar este artículo](#)

 [Agregar a favoritos](#)

 [Enviar a e-mail](#)

 [Imprimir HTML](#)

Arch. med. vet. v.35 n.1 Valdivia 2003

Arch. Med. Vet., Vol. XXXV, N° 1, 2003, pp. 95-97

### COMUNICACIONES

## Isolation of thermotolerant species of *Campylobacter* from river water using two collection methods <sup>\*</sup>

**Aislamiento de especies termotolerantes de *Campylobacter* de aguas fluviales utilizando dos métodos de colecta**

**H. FERNANDEZ<sup>1</sup>**, TM, D.Sc.; L. OTTH, TM; M. WILSON, TM.

\* This work received financial support from Grants FONDECYT 1980920 and DID-UACH S-2001-33. Instituto de Microbiología Clínica, Universidad Austral de Chile, PO Box 567, Valdivia, Chile.

<sup>1</sup> Corresponding author.e-mail: [hfernand@uach.cl](mailto:hfernand@uach.cl)

### Resumen

*Campylobacter jejuni* y *C. coli* son agentes zoonóticos de infecciones intestinales que pueden contaminar cuerpos de agua. Varios brotes de gastroenteritis por *Campylobacter* asociados al consumo de agua han sido descritos. En este estudio se compara el rendimiento de los métodos de la tórula de Moore (MSM) y de filtración por membrana para el aislamiento de *Campylobacter* en

termotolerantes de *Campylobacter*, siendo *C. coli* aislado en mayor proporción que *C. jejuni*. Los resultados sugieren que MSM es un método eficiente para el aislamiento de estas bacterias a partir de agua.

**Palabras claves:** *Campylobacter jejuni*, *C. coli*, agua, tórula de Moore, técnica de filtración por membranas.

## Summary

*Campylobacter jejuni* and *C. coli* are zoonotic agents of intestinal infection that could contaminate water bodies. Several outbreaks of *Campylobacter* gastroenteritis associated with the consumption of contaminated water have been reported. Various methods have been described to determine the presence of these bacteria in water bodies. In this study the performance of the Moore swab (MSM) and the filtration through membrane methods (MFM) for the isolation of *Campylobacter* from 181 water samples obtained from the urban course of the Calle-Calle river water samples was compared. *Campylobacter* species were isolated in 24.3% of the samples obtained with MSM and in 7.2% of those processed by MFM thus, appearing MSM as an efficient method to isolate *Campylobacter* from river water samples.

**Key words:** *Campylobacter jejuni*, *C. coli*, water, Moore swab, membrane filtration technique.

---

## INTRODUCTION

The thermotolerant species of *Campylobacter*, *C. jejuni* and *C. coli* are considered as important agents of intestinal infection all over the world ([Allos and Blaser, 1995](#); [Fernández, 1992](#); [Friedman et al., 2000](#)). Many domestic and wild animals are known as natural reservoirs that, together with sewage, could contaminate water bodies. Both species can survive in water from several days to several weeks, depending on water temperature ([Anderson et al., 1997](#); [Pickert and Bozenhart, 1985](#)).

Several outbreaks of *Campylobacter* gastroenteritis associated with the consumption of contaminated water have been reported ([Anderson et al., 1997](#); [Sacks et al., 1986](#); [Skerjve and Brennhovd, 1992](#); [Jacobs-Reitsma, 2000](#)).

Various methods have been described in order to determine the presence of enteropathogenic bacteria in water, being enrichment procedures and filtration through membranes the most frequently used ([Bolton et al., 1987](#); [Mathewson et al., 1983](#)). The Moore swab is a concentration method described in 1948 to isolate *Salmonella* and *Vibrio cholerae* from water ([Barret et al., 1980](#)). However, little information is available in relation to the isolation of *Campylobacter* species from water bodies using this method. The Moore swab was used previously in a pilot study in our laboratory ([Fernández et al., 1990](#)).

In this study we compared the performance of the Moore swab (MSM) and the filtration through membrane (MFM) methods for the isolation of thermotolerant species of *Campylobacter* from water samples obtained from the Calle-Calle river, Valdivia, Chile (39° 47' Southern latitude, 73° 15' Western latitude).

## MATERIAL AND METHODS

We obtained duplicated water samples (181 for MSM and 181 for MFM) from different points of the urban course of the Calle-Calle river (26 Km long, 297 m average wide), according to the following methods:

Moore Swab Method (MSM) ([Fernández et al., 1990](#)): consists of a piece of gauze of 70x22 cm, folded several times to form cylindrical rolls which were wrapped in thick paper and autoclaved. Each swab, attached to a 5 m long nylon string, was left for 24 hrs in the river. When removed,

the gauze. This medium consisted of Brucella broth, FBP supplement (ferrous sulphate, sodium metabissulfite and sodium pyruvate 0.5 g/L of each), vancomycin (20 mg/L), polymyxin B (5.000 I.U./L), trimethoprim (10 mg/L), cephalotine (20 mg/L) and anphotericin (4 mg/L). The flasks were incubated at 42°C for 48 hrs under microaerobic atmosphere, and 200 µl were seeded on Butzler selective medium incubated as described above.

Membrane Filtration Method (MFM) ([Mathewson et al., 1983](#)): Four litre of water were passed through a sterile 47 mm membrane filter (Millipore) with 0.45 µm pore size, using a vacuum pump. The filter was aseptically placed into a flask containing 100 ml of the enrichment broth described above. The rest of the procedure was similar to that used with the MSM.

Suspect *Campylobacter* colonies were seeded on blood agar in order to obtain pure culture and then, they were identified and biotyped by their morphological characteristics, susceptibility to cephalotine and nalidixic acid and by their capacity to produce hypuricase, desulphydrase and DNase ([Fernández et al., 1990](#)).

## RESULTS AND DISCUSSION

As shown in [table I](#), 24.3% of the samples were positive for *Campylobacter* using the MSM method whereas, with the MFM, only in 7.2% these micro-organisms were isolated, being this difference statistically significant (chi-square test). The higher isolation rate obtained with the MSM could be due to the fact that the swabs remain during 24 hrs into the water, thus allowing filtration of a great quantity of water and the capture of *Campylobacter* cells, as well as other micro-organisms, suspended in the water. The water sample volume used for the MFM was 4 L, an amount that compared with the MSM, could be insufficient to allow a higher isolation rate.

**TABLE I. Isolation rates of *Campylobacter* species using the Moore Swab and the Membrane Filtration Methods.**

Aislamiento de especies de *Campylobacter* utilizando la tórula de Moore y el Método de Filtración por Membrana.

METHOD	POSITIVE SAMPLES		<i>C. coli</i>		<i>C. jejuni</i>	
	N/n	%	N/n	%	N/n	%
Moore Swab	44/181*	24.3	34/44	77.3	10/44	22.7
Membrane filtration	13/181*	7.2	10/13	76.9	3/13	23.1

N= number of positive samples; n= total number of samples; \*p<0.01

Contrarily to earlier reports ([Bolton et al., 1987](#); [Skerjve and Brennhovd, 1992](#)), *C. coli* was most frequently isolated (77.3%) than *C. jejuni* (22.7%). Similar results were obtained with both methods (MASM and MFM). A higher isolation rate of *C. coli* from wastewater samples was observed by [Höller \(1988\)](#) and in river water samples by [Fernández et al. \(1990\)](#). Some authors suggested that *C. coli* could be more resistant than *C. jejuni* to environmental conditions ([Tresierra-Ayala et al., 1999](#)). That could explain the differences observed in the isolation rates between both species. Currently, experimental studies are carried out in our laboratory in order to establish if *C. coli* is more resistant than *C. jejuni* to environmental conditions. Despite this difference, it is necessary to bear in mind that both species are considered as important agents of diarrheal disease, and contaminated water are recognised as an epidemiological source of outbreaks as well as sporadic cases of intestinal campylobacteriosis.

Our results show that the MSM is an efficient method to isolate *Campylobacter* species. Recently we start to use the MSM to isolate *Arcobacter* species from the same type of samples with good results (data not showed). Based on these results we propose the use of MSM as an adequate, easy and

## REFERENCES

- ALLOS, B. M., M. J. BLASER. 1995. *Campylobacter jejuni* and the expanding spectrum of related infections. *J. Clin. Infect. Dis.* 20: 1092-1101
- ANDERSON, Y., B. DE JONG, A. STUDAHL. 1997. Waterborne *Campylobacter* in Sweden: the cost of an outbreak. *Water Sci. Technol.* 35: 11-14.
- BARRET, T. J., P. A. BLAKE, G. K. MORROS, N. D. PUHR, H. B. BRADFORD, J. G. WELLS. 1980. Use of Moor swabs for isolating *Vibrio cholerae* from sewage. *J. Clin. Microbiol.* 11: 385-388.
- BOLTON, F. J., D. COATES, D. D. HUTCHINSON, A. F. GODFREE. 1987. A study of thermophilic *campylobacters* in a river system. *J. Appl. Bacteriol.* 62: 167-176.
- FERNÁNDEZ, H. 1992. Thermotolerant *Campylobacter* species associated with human diarrhea in Latin America. *J. Braz. Ass. Adv. Sci. (Ciência e Cultura)* 44: 39-43
- FERNÁNDEZ, H., A. TEJERO, M. GUTIÉRREZ, A. CABRERA, E. LANDSKRON. 1990. Moore swab: an inexpensive method for the isolation of enteropathogenic species of *Campylobacter* from surface waters. In: Castillo, G., V. Campos, L. Herrera, (eds). *Proceedings Second Biennial Water Quality Symposium: Microbiological Aspects*. Editorial Universitaria, Santiago. pp. 257-260.
- FRIEDMAN, C. R., J. NEIMANN, H. C. WEGENER, R. V. TAUXE. 2000. Epidemiology of *Campylobacter jejuni* in the United States and other industrialized nations. In: Nachamkin, I., M.J. Blaser, (eds). *Campylobacter*. 2<sup>nd</sup> edition. ASM Press. Washington, D.C. pp.121-138.
- HÖLLER, C. 1988. Quantitative and qualitative investigations on *Campylobacter* in sewage system of a big town. *Zbl. Bakt. Hyg. B* 185: 307-325.
- JACOBS-REITSMA, W. 2000. *Campylobacter* in the food supply. In: Nachamkin, I., Blaser, M.J. (eds). *Campylobacter*. 2<sup>nd</sup> edition. ASM Press. Washington, D.C. pp. 467-481.
- MATHEWSON, J. J., B. H. KESWICK, H. L. DUPONT. 1983. Evaluation of filters for recovery of *Campylobacter jejuni* from water. *Appl. Environ. Microbiol.* 46: 985-987.
- PICKERT, A., K. BOTZENHART. 1985. Survival of *Campylobacter jejuni* in Drinking-Water, River-Water and Sewage. *Zbl. Bakt. Hyg. B* 182: 49-57.
- SACKS, J. J., S. LIEB, L. M. BALDY, S. BERTA, C. M. PATTON, M. C. WHITE, W. J. BIGLER, J. J. WITTE. 1986. Epidemic campylobacteriosis associated with community water supply. *Am. J. Publ. Hlth.* 76: 424-429.
- SKJERVE, E., O. BRENNHOVD. 1992. A multiple logistic model for predicting the occurrence of *Campylobacter jejuni* and *Campylobacter coli* in water. *J. Appl. Bacteriol.* 73: 94-98.
- TRESIERRA-AYALA, A., R. RUIZ, M. BENDAYAN, H. FERNÁNDEZ. 1999. Survival times of *Campylobacter coli* in sterilized buffalo milk. *J. Vet. Med. B.* 46: 141-144.

Aceptado: 23.04.2003.