SPECIES AND BIOTYPE DISTRIBUTION OF THERMOTOLERANT CAMPYLOBACTERS IN ANIMAL RESERVOIRS IN SOUTHERN CHILE

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SUMMARY

The prevalence of thermotolerant campylobacters in mammals and birds from Southern Chile was determined. Campylobacters were isolated from 46.3% of the animals studied being C. jejuni biotipe 1 the most frequent (25.7%) followed by C. coli (17.4%) and C. jejuni biotipe 2 (3.2%).

KEY WORDS: Campylobacter; Campylobacteriosis; Reservoirs; Epidemiology.

INTRODUCTION

Thermotolerant campylobacters - Campylobacter jejuni and C. coli - are recognized as important agents of acute diarrheal illness in humans. These microorganisms are widely distributed all over the world having as natural reservoirs a great variety of animal species including companion, domestic and wild animals. Human illness considered as zoonosis can be acquired by contact with animals, by drinking contaminated water with animal faeces or by ingestion of contaminated food of animal origin.

In view of the lack of information about the natural distribution of thermotolerant campylobacters in this region of the world, a study was undertaken to determine the prevalence of C. jejuni and C. coli in different mammals and birds from southern Chile (province of Valdivia), southern latitude 39°15'-40°15'.

MATERIALS AND METHODS

A total of 631 fecal samples obtained by rectal swabs from 150 dogs, 80 pigs, 80 cows, 40 cats, 100 hens, 75 sparrows, 60 geese and 46 pigeons were studied. None of the animals subjected to this study showed clinical symptoms of diarrhea. Rectal samples were obtained using commercial sterile swabs (Linsan Laboratories, Chile) supplied with a 1 ml ampule of Cary Blair transport medium. After collection of the sample the ampules were crushed to moisten the swabs. Each sample was identified with an appropriate code number, and within 2 to 6 hours after collection were seeded on modified Skirrow's medium comprising Brucella agar (Difco), 5% horse blood, Skirrow's Antibiotic Supplement (Oxoid) plus 10 mg/l of cephalotin (Lilly) and FBP Supplement (Oxoid). Inoculated plates were incubated at 43°C for 48 hours under microaerobic conditions utilizing the Gas generating box Campylobacter system (bio Mérieux).

After the incubation period, the plates were examined for the presence of colonies presumed to be Campylobacter sp. The identification was made first presumptively using catalase and oxidase reactions (both positive) and the morphological features observed in Gram stain (curved S-shaped rods). Later, the Campylobacter species and biotypes were identified using the criteria propose by SKIRROW & BENJAMIN.
RESULTS

Campylobacters were isolated from 292 (46.3%) of the animals studied. The highest isolation rate was found in pigs (70%), followed by hens (60%) and dogs (51.4%). The lowest rate was found in pigeons (17.4%).

*C. jejuni* biotype 1 was the most frequently isolated (25.7%) and was found in all the animals studied. *C. coli* was isolated from all the animals but not from cats and pigeons, with an average frequency of 17.4%. *C. jejuni* biotype 2 was not found in hens, sparrows and pigeons and presented the lowest isolation rate (3.2%). Table 1 shows the distribution of these campylobacters among the animal reservoirs studied.

### Table 1

<table>
<thead>
<tr>
<th>Animals studied (n)</th>
<th>C. jejuni biotype 1</th>
<th>C. jejuni biotype 2</th>
<th>C. coli</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nº</td>
<td>%</td>
<td>Nº</td>
<td>%</td>
</tr>
<tr>
<td>Dogs (150)</td>
<td>46</td>
<td>30.7</td>
<td>6</td>
<td>4.0</td>
</tr>
<tr>
<td>Pigs (80)</td>
<td>8</td>
<td>10.0</td>
<td>4</td>
<td>5.0</td>
</tr>
<tr>
<td>Cows (80)</td>
<td>12</td>
<td>15.0</td>
<td>6</td>
<td>7.5</td>
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<tr>
<td>Cats (40)</td>
<td>6</td>
<td>15.0</td>
<td>3</td>
<td>7.5</td>
</tr>
<tr>
<td>Hens (100)</td>
<td>45</td>
<td>45.0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Sparrows (75)</td>
<td>21</td>
<td>28.0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Geese (60)</td>
<td>16</td>
<td>26.7</td>
<td>1</td>
<td>1.7</td>
</tr>
<tr>
<td>Pigeons (46)</td>
<td>8</td>
<td>17.4</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Total (631)</td>
<td>162</td>
<td>25.7</td>
<td>20</td>
<td>3.2</td>
</tr>
</tbody>
</table>

DISCUSSION

Birds and mammals constitute important links in the epidemiological chain of *Campylobacter* infections. We studied several animal reservoirs that, according to their epidemiological relations with humans, can be divided in four groups: 1. companion animals (dogs and cats); 2. food animals (cows and pigs); 3. poultry (hens and geese); 4. wild birds (sparrows and pigeons). Our results show that thermotolerant species of *Campylobacter* were present in high frequency in all of them.

*C. jejuni* biotype 1 was isolated from all the animals under study with an average frequency of 25.7%. *C. jejuni* biotype 2, with a frequency of 3.2%, was found in all the animals but not in hens, sparrows and pigeons. With the exception of the cats and pigeons fecal samples, *C. coli* was isolated from the other animal feces with a frequency of 17.4%. SKIRROW and SHANKER et al. reported that *C. jejuni* biotype 1 was the most prevalent in fecal samples from hens and dogs. Our results support these findings. However they found that *C. jejuni* biotype 2 was also frequent isolated (25.7%) and was found in all the animals studied. *C. coli* was isolated from all the animals but not from cats and pigeons, with an average frequency of 17.4%. *C. jejuni* biotype 2 was not found in hens, sparrows and pigeons and presented the lowest isolation rate (3.2%). Table 1 shows the distribution of these campylobacters among the animal reservoirs studied.

Some differences in the epidemiology of campylobacteriosis have been established among developed and developing countries such as the high percentage or normal carriers and a greater frequency of cases in the first two years of life observed in the latter countries. The fact that *C. jejuni* biotype 2 is less and *C. coli* more frequent in hens and dogs in Brazil and southern Chile, could be considered a peculiar epidemiological situation observed in developing countries. However, more data must be made available from third world countries to establish definitively this statement.

The prevalence of *Campylobacter* in dogs (51.4%) was higher than that obtained by
McORIST & BROWNING in Australia (9.5%) and JORGENSEN in Denmark (11.1%). Nevertheless, it was similar to that reported by SIMPSON et al. in stray dogs (52.6%) in England. Remarkable differences exist in the incidence of intestinal carriage of Campylobacter among stray and pet dogs. Although all the dogs studied had an individualized owner, many of them presented loiterer habits reflecting a poor standard of canine hygiene that predisposes to intestinal colonization with Campylobacter.

The prevalence of Campylobacter in cats (22.5%) was higher than that reported by McORIST & BROWNING in Australia (3%) and by PATTON et al. in U.S.A. (14%). Because the cats studied presented the same habits observed in the dogs (owners references) we can use the same considerations as SKIRROW to explain the high isolation rates of Campylobacter obtained in both animal species. These results constitute another evidence of the importance of dogs and cats as natural reservoirs of Campylobacter as potential sources for human infections.

The fecal carriage of Campylobacter in pigs (70%) was very similar to that reported by STICHT-GROH in Germany (77%) and LUECHTEFELD & WANG in U.S.A. (71%), but lower to that published by ROSEF et al. in Norway (100%). The fact that C. coli forms part of the normal intestinal flora of pigs explains the high isolation frequency of this bacteria (55%) in the pigs subjected to our study.

Campylobacter was found in 30% of the cows under study. This result is lower than reported by LUECHTEFELD & WANG in U.S.A. (43%) but higher than the results obtained by SWEDHEM & KAIJSER in Sweden (19%).

The isolation of thermotolerant Campylobacter in high frequency from these two animals indicate their importance as natural reservoirs and sources of these bacteria for man. Humans can acquire the infection by contact with these animals or by consumption of contaminated meats and milk.

In hens and geese the Campylobacter isolation rate was 60% and 46.7% respectively. High isolation rates of Campylobacter from both, slaughtered and alive hens, is a common fact in many countries. Wild geese harbour these microorganisms frequently in their intestinal tract.

Poultry constitutes an important vehicle of Campylobacter and the role of poultry meat in the illness transmission is well established. The isolation rate of Campylobacter in sparrows was 40%. The corresponding values found by MATSUSAKI et al. in Japan was only 10% whereas, KAPPERUD & ROSEF did not isolated any Campylobacter from sparrows in Norway.

In pigeons we isolated only C. jejuni biotype 1 with a frequency of 17.4% reported by MATSUSAKI et al. and KAPPERUD & ROSEF reported 7% and 4.2% of intestinal carriage of Campylobacter in pigeons respectively. WEBER et al. demonstrated that Campylobacter can be isolated with high frequency (54.9%) from carrier pigeons. Sparrows and pigeons are wild birds that can live near man and may be sources of contamination for water supplies and the environment as it has been previously suggested.

Except for studies on pigs and hens, this work is the first study in Chile to ascertain the prevalence of thermotolerant Campylobacters in animals. We think that more studies are necessary to understand the epidemiology of campylobacteriosis that seems to be a very complex phenomenon in developing countries.

RESUMO

Espécies e biotipos de Campylobacter termotolerantes em reservatórios animais do sul do Chile.

Foi determinada a prevalência de Campylobacter termotolerantes em mamíferos e aves do sul do Chile.

Campylobacter foi isolado em 46,3% dos animais estudados sendo C. jejuni biotipo 1 o mais frequente (25,7%) seguido de C. coli (17,4%) e C. jejuni biotipo 2 (3,2%).

REFERENCES


3. FERNANDEZ, H. — Thermophilic species of Campylo-
lobacter: bacteriological, epidemiological and patho-
4. FERNANDEZ, H.; TOLEDO, M.R.F.; FAGUNDES NETO, U. & TRABULSI, L.R. — Isolation of Campylo-
5. FERNANDEZ, H.; TOLEDO, M.R.F.; FAGUNDES NETO, U. & TRABULSI, L.R. — Occurrence of Campylo-
6. FIGUEROA, G.; TOLEDO, M.S.; TRONCOSO, M. & SEPULVEDA, C. — Isolation of Campylobacter fe-
7. FIGUEROA, G.; TRONCOSO, M.; ALCAYDE, M.P. & SEPULVEDA, C. — Isolation of Campylo-
9. FOX, J.G.; MOORE, R. & ACKERMANN, L.B. & WANG, W.L.L. — Isolation of Campylo-
10. HARRIS, N.V.; WEISS, N.S. & NOLAN, C.M. — The role of poultry and meats in the etiology of Campylo-
11. HOPKINS, R. & SCOTT, A.S. — Handling raw chic-
ken as a source for sporadic Campylobacter jejuni in-
12. JORGENSEN, K. — Prevalence of Campylobacter fe-
13. KAPPERUD, G. & ROSEF, O. — Avian wildlife re-
14. LEVIN, S. & GOODMAN, L. — Campylobacter in-
15. LUECHTFELD, N.A.W.; BLASER, M.J.; REL-
LER, L.B. & WANG, W.L.L. — Isolation of Campylo-
18. MATSUKASI, S.; KATAYAMA, A. & ITAGAKI, K. — Prevalence of Campylobacter jejuni and C. coli in wild birds and domestic animals in Yamaguchi, Japan. In: INTERNATIONAL WORKSHOP ON CAMPY-
borne outbreak of Campylobacter gastroenteritis. Lanc-
24. PRESCOTT, J.F. & MUNROE, D.I. — Campylobac-
33. SKIRROW, M.B. & BENJAMIN, J. — Differentia-
35. SVEDHED, A. & KAJSER, B. — Campylobacter je-
36. VOGR, R.L.; SOURS, H.E.; BARRET, T.; FELD-
MAN, R.A.; DICKINSON R.J. & WITHERELL, L. — Campylobacter enteritis associated with contamina-
37. WEBER, V.A.; LEMBIKE, C. & KETTNER, A. — Oc-
currence of Campylobacter jejuni in faecal samples of clinically healthy carrier pigeons. Berl. Munch. tier-

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