aJava

Asian Journal of Animal and Veterinary Advances

Academic
Journals Inc.

www.academicjournals.com

Asian Journal of Animal and Veterinary Advances 7 (8): 754-760, 2012
ISSN 1683-9919 / DOI: 10.3923/ajava.2012.754.760
© 2012 Academic Journals Inc.

Prevalence of *Campylobacter* sp. in Dogs Attending Veterinary Practices at Mathura, India and Risk Indicators Associated with Shedding

[1]Rajesh Kumar, [2]A.K. Verma, [3]Amit Kumar, [4]Mukesh Srivastava and [5]H.P. Lal
[1]Department of Veterinary Clinical Medicine, [2]Department of Veterinary Epidemiology and Preventive Medicine, [3]Department of Veterinary Microbiology and Immunology, [4]Department of Veterinary Clinical Medicine, [5]Department of Veterinary Clinical Medicine, Uttar Pradesh Pandit Deen Dayal Upadhayay Pashu Chikitsa Vigyan Vishvidhyalaya Evum Go-Anusandhan Sansthan (DUVASU), Mathura, U.P., 281001, India

Corresponding Author: Rajesh Kumar, Department of Veterinary Clinical Medicine, Uttar Pradesh Pandit Deen Dayal Upadhayay Pashu Chikitsa Vigyan Vishvidhyalaya Evum Go-Anusandhan Sansthan (DUVASU), Mathura, U.P., 281001, India

ABSTRACT

Campylobacteriosis is one of the leading causes of gastroenteritis in humans and various researches suggested that owning a pet is a risk factor for the disease. To determine the prevalence and risk indicators for *Campylobacter* sp. infecting dogs attending veterinary practice at TVCC, DUVASU, Mathura, 100 dogs with and without the clinical symptoms of diarrhoea were examined and the prevalence of *Campylobacter* sp. was 51.0%. Breed wise prevalence showed that nondescript (73.68%) dogs were more likely to carry *Campylobacter* sp. A significant difference in isolation rates was observed between younger and older dogs: 56.58% of the younger dogs (≤ 1 year) were positive, compared with 33.33% of adult dogs (> 1 year) ($p<0.01$) as seen at the veterinary University, Mathura, India. Dogs sharing a household with another dog, dogs that had not received antibiotic treatment in the previous months and the age of the dog were significant indicators of Campylobacter carriage. Recent diarrhoea or vomiting in dogs with Campylobacter, breed, sex or vaccination status were not statistically significant. The high prevalence of *Campylobacter* in puppies supports the hypothesis that dogs, particularly young ones shed *Campylobacter* spp., which can be of impact for public health.

Key words: *Campylobacter*, dog, prevalence, predisposing factor

INTRODUCTION

Campylobacter spp. is one of the leading causes of human bacterial gastroenteritis (Adak *et al*., 2002; Anonymous, 2008; Acke *et al*., 2009) globally and also responsible for the mortality and morbidity, especially among children. Campylobacters have been reported to cause severe conditions like Guillian Barre syndrome, Chinese paralytic syndrome, hepatitis, meningitis and reactive arthritis (Allos, 1997; Korman *et al*., 1997; Tenkate and Stafford, 2001). The incidence of campylobacteriosis in patients i.e., those using immunosuppressive drugs, having acquired immunodeficiency syndrome (AIDS) was 39 times higher than the rate in general population (Sorvillo *et al*., 1991; Robinson and Pugh, 2002), which is the cause for concern, especially in developing countries like India. There is evidence of increased risk of *Campylobacter* infection in humans associated with dog or pet ownership (Kapperud *et al*., 1992; Adak *et al*., 1995;

Tenkate and Stafford, 2001). Dogs and cats and have been identified as asymptomatic carrier of *Campylobacter* spp. and shedding it in their faeces. Pathogens in their faeces may ultimately infect other animals by contaminating the environment (Morse and Duncan, 1975; Fox, 1990; Hald and Madsen, 1997). The prevalence of *Campylobacter* sp. carriage also appears high in Kennelled dogs relative to other populations (Workman *et al*., 2005; Acke *et al*., 2006; Tsai *et al*., 2007). Keeping in view the above facts the present study was carried out to determine the prevalence of the *Campylobacter* sp. carrier status of dogs attending veterinary practice at Teaching Veterinary clinical complex, DUVASU, Mathura and to identify possible predisposing factors.

MATERIALS AND METHODS

During the study period (between October, 09 to April 10), dogs visiting veterinary practice at Teaching Veterinary Clinical Complex (TVCC), DUVASU, Mathura for any reason including routine checks, neutering, vaccination or clinical disease, were selected as the target population. Owner consent was obtained for sampling, along with details of the animal's signalment and health status. A total of 100 rectal swabs from dogs were collected aseptically and brought to laboratory at 4°C for the isolation of *Campylobacter* sp.

Bacterial culture: All the samples were processed in *Campylobacter* Enrichment Hi VegTM Broth Base (HiMedia, Mumbai) with addition of polymyxin B sulphate, rifampicin, trimethoprim and cycloheximide (*Campylobacter* selective IV, HiMedia, Mumbai) and incubated at 42-43°C for 24 h. After incubation, the inoculums was streaked onto selective media (*Campylobacter* selective agar, HiMedia, Mumbai) supplemented with 10% defibrinated lysed sheep blood and reconstituted contents of *Campylobacter* selective-I (HiMedia, Mumbai) containing polymixin B, vancomycin, trimethoprim and cephalothin and incubated for 48 h at 42-43°C under microaerophilic conditions. Characteristic Campylobacter colonies were picked up and subjected to presumptive identification like Gram's staining, motility, oxidase and catalase test and further subjected to biochemical test for confirmation (Skirrow and Benzamin, 1980; Gracia *et al*., 1985).

Statistical analysis: The prevalences of *Campylobacter* species recovered from the samples in each group (cohabitation with another dog; recent (within the past month) antibiotic treatment; recent clinical signs such as diarrhoea or vomition; sex; breed and age) were compared using chi-squared analysis as per Snececor and Cochran (1980).

RESULTS

Campylobacter sp. were isolated from 51 of the 100 dogs, giving a carrier status prevalence of 51.00% (Table 1). Dogs in cohabitation with other dog, which were positive for *Campylobacter* sp. were significantly associated with carrier status ($p<0.05$). Although there was a trend for dogs that had not received antibiotic treatment in the previous month to be positive for *Campylobacter* sp. but this was not statistically significant. Clinical signs such as diarrhea and/or vomition could be observed in dogs. Of the dogs sampled, 43 had such clinical signs. No significant association was found between clinical signs and *Campylobacter* isolation in the faecal sample. Similarly, there were no significant associations between *Campylobacter* sp. carrier status and sex. However, in breed wise prevalence analysis we could not include all the breeds because in some breeds numbers of animals were very low. Breed wise prevalence analysis revealed that presence of *Campylobacter* varied significantly ($p<0.05$) among different breeds (Table 1). It was the higher

Table 1: Prevalence of *Campylobacter* spp. in dogs influenced by cohabitation with other dog, recent antibiotic treatment, clinical signs, sex, breed and age

Risk factors status	No. tested	Positive	Percentage positivity
Cohabitation with other dog*			
Yes	18	14	77.78
No	82	39	47.56
Total	100	51	51.00
Recent antibiotic treatment			
Yes	25	18	72.00
No	75	33	44.00
Recent diarrhoea or vomiting			
Yes	57	31	54.38
No	43	20	46.51
Sex			
Male	62	31	50.00
Female	38	20	52.63
Breed*			
Nondescript	19	14	73.68
Other breed	81	37	45.68
Age**			
= 1 year	76	43	56.58
> 1 year	24	8	33.33

*Significant at ($p<0.05$), **Significant at ($p<0.01$)

in nondescript (73.68%) dogs as compared to the breed (45.68%). *Campylobacter* spp. were isolated from 43 of the 76 dogs that were aged one year old or younger (56.58%) and from 8 of the 24 older dogs aged >1 year (33.33%) ($p \leq 0.01$) (Table 1).

DISCUSSION

Campylobacters are now getting increasing recognition as important human and animal pathogens. The results showed that *Campylobacter* sp. were common in dogs. The 51.00% prevalence of *Campylobacter* sp. in canine faecal samples reported in this study was in the upper side of the range (17-59%) of prevalence data previously reported (Sandberg *et al*., 2002; Engvall *et al*., 2003; Hald *et al*., 2004; Koene *et al*., 2004; Wieland *et al*., 2005; Rossi *et al*., 2008; Acke *et al*., 2009; Parsons *et al*., 2010). Differences between these studies may reflect differences in the populations investigated, or in the detection methods used for *Campylobacter* infection (Hald and Madsen, 1997; Byrne *et al*., 2001; Kulkarni *et al*., 2002; Labarca *et al*., 2002; Sandberg *et al*., 2002; Lastovica and Roux, 2003; Hald *et al*., 2004; Wieland *et al*., 2005; Acke *et al*., 2006; Guest *et al*., 2007; Rossi *et al*., 2008; Acke *et al*., 2009; Parsons *et al*., 2010). Dogs' cohabitant with other dogs was more likely to carry *Campylobacter* sp. as previously reported (Torre and Tello, 1993; Workman *et al*., 2005; Parsons *et al*., 2010). Torre and Tello (1993) pointed out that overcrowding increases the probability of acquiring infection and found a higher prevalence of the agent among animals that lived with other animals. This prevalence was more important and statistically significant, if they lived with positive ones. Acke *et al*. (2006) suggested that dogs housed in groups, such as kennels, had a higher prevalence of *Campylobacter* carriers, possibly due to crossinfection. Damborg *et al*. (2008) found indistinguishable amplified fragment length polymorphism patterns in *Campylobacter* strains isolated from dogs sharing a house or kennel. The prevalence in dogs living in groups (for example pounds and kennels) was higher than

in single household pets, probably as a result of the stress, frequent dietary changes and increased incidence of gastrointestinal disease suffered by animals in pounds or kennels (Acke *et al*., 2009). Although there was a trend for dogs that had not received antibiotic treatment in the previous month to be positive for *Campylobacter* sp. but this was not statistically significant. Of the 57 dogs having diarrhoea or vomition, *Campylobacter* sp. could be isolated for 37 dogs, showing higher prevalence of *Campylobacter* infection in diarrheic dogs (Table 1). However, statistically significant relationship between the carrier state and the development of clinical campylobacteriosis in dogs could not be found. Similar to our findings some earlier studies also found no significant relationship between diarrhoea and *Campylobacter* spp. infection status (Sandberg *et al*., 2002; Engvall *et al*., 2003; Workman *et al*., 2005; Acke *et al*., 2006; Rossi *et al*., 2008; Parsons *et al*., 2010), suggesting that the organism is a commensal (Engvall *et al*., 2003), while others report an association between infection and clinical signs (Guest *et al*., 2007), particularly in younger dogs (Fox *et al*., 1983; Nair *et al*., 1985; Burnens *et al*., 1992). As majority of these animals had concurrent gastrointestinal disease, *Campylobacter* infection was probably secondary to this underlying disease. *Campylobacter* sp. can be found in dogs with gastrointestinal signs as an opportunistic infection (for example, secondary to exocrine pancreatic insufficiency, endoparasites, or coronavirus and parvovirus infections) and they may act as a primary or secondary pathogen (Olson and Sandsted, 1987). The link between the gastrointestinal signs and the presence of *Campylobacter* organisms has been investigated but is still unclear. In addition, there have been large differences between the designs of the studies and standardised studies are needed to determine whether *Campylobacter* sp. can cause significant disease as a primary pathogen (Olson and Sandsted, 1987; Sandberg *et al*., 2002; Acke *et al*., 2006, 2009). *Campylobacter*-confirmed cultures were detected in 46•51% of the healthy dogs showing that asymptomatic animals can be carriers of *Campylobacter* sp. These animals may be an important reservoir for *Campylobacter* sp. and a source of infection for other pets and human beings (Olson and Sandsted, 1987; Acke *et al*., 2006, 2009). There was no statistically significant association between *Campylobacter* carrier status and sex (Nair *et al*., 1985; Parsons *et al*., 2010). There was significant difference of the *Campylobacter* sp. prevalence in nondescript dogs (73.68%) as compared to breed dogs (45.68%). The probable reason may be the way of rearing of dogs, as non descriptive ones are allowed to move outside the home more freely in comparison to breed dogs and thus may get infection from stray dogs and other animals leaving in and around the residential areas.

When age was investigated as a risk indicator for *Campylobacter* sp. carriage in dogs, similar to previous studies (Torre and Tello, 1993; Sandberg *et al*., 2002; Engvall *et al*., 2003; Wieland *et al*., 2005; Acke *et al*., 2006; Guest *et al*., 2007; Acke *et al*., 2009) we also found that younger rather than older dogs were more likely to carry *Campylobacter* sp. suggesting an age predisposition and the consequence of age-related immunity. However, a small number of reports (Wieland *et al*., 2005; Tsai *et al*., 2007) have suggested that age is not a predisposing factor for *Campylobacter* infection.

This study has the limitations of a cross-sectional design; nevertheless, it is performed in only one veterinary practice considering a small number of population and few related variables. A detailed study should be conducted considering larger sample size or whole population in order to accomplish a better understanding of the epidemiology of this disease in developing countries and in that way facilitate the decisions about actions to diminish the risk of this infection in human beings.

CONCLUSIONS

The high prevalence of *Campylobacter* carriers found in dogs in this study suggests the bacteria may be intestinal commensal in this species. Although the relationship between the presence of *Campylobacter* sp. and gastroenteritis in both dogs and humans is still not very clear, the prevalence of *Campylobacter* sp. infection in our studied population was high; such animals attending veterinary practice are likely to be a source of *Campylobacter* sp. infection for humans. We observed that dogs' = one year old had higher prevalence of *Campylobacter* infection than adult dogs; it is worth highlighting that puppies in particular may pose a zoonotic risk. To establish the zoonotic potential of canine *Campylobacter* isolates, both human and canine isolates have to be further characterized and compared.

ACKNOWLEDGMENTS

The authors of this study are highly thankful to Dr. Manoj Kumar Gupta, Incharge, Department of Veterinary Microbiology and Immunology, Dean, CVSc. AH and also would like to thank Hon'ble Vice Chancellor, DUVASU, Mathura; for providing funds and necessary facilities to conduct the study; Sri Rakesh Goel, Incharge, Department of Animal Genetics and breeding; for providing the statistical help, the staff at the TVCC; for collecting the samples and the owners of the dogs who gave their permission for their dogs to take part in the study.

REFERENCES

Acke, E., K. McGill, O. Golden, B.R. Jones and S. Fanning, 2009. Prevalence of thermophilic *Campylobacter* species in household cats and dogs in Ireland. Vet. Rec., 164: 44-47.

Acke, E., P. Whyte, B.R. Jones, K. McGill, J.D. Collins and S. Fanning, 2006. Prevalence of thermophilic *Campylobacter* species in cats and dogs in two animal shelters in Ireland. Vet. Record, 158: 51-54.

Adak, G.K., J.M. Cowden, S. Nicholas and H.S. Evans, 1995. The public health laboratory service national case-control study of primary indigenous sporadic cases of *Campylobacter* infection. Epidemiol. Infect., 115: 15-22.

Adak, G.K., S.M. Long and S.J. O'Brien, 2002. Intestinal infection: Trends in indigenous foodborne disease and deaths, England and Wales: 1992 to 2000. Gut, 51: 832-841.

Allos, B.M., 1997. Association between Campylobacter infection and Guillain-barre syndrome. J. Infecti. Dis., 176: 125-128.

Anonymous, 2008. Preliminary food net data on the incidence of infection with pathogens transmitted commonly through food-10 states, 2007. Centers for Disease Control and Prevention, Morbidity and Mortality Weekly Report 57, pp: 366-370.

Burnens, A.P., B. Angeloz-Wick and J. Nicolet, 1992. Comparison of *Campylobacter* carriage rates in diarrheic and healthy pet animals. Zentralbl. Veterinarmedizin B, 39: 175-180.

Byrne, C., D. Doherty, A. Mooney, M. Byrne and D. Woodward *et al*., 2001. Basis of the superiority of cefoperazone amphotericin techoplanin for isolating *Campylobacter upsaliensis* from stools. J. Clin. Microbiol., 39: 2713-2716.

Damborg, P., L. Guardabassi, K. Pedersen and B. Kokotovic, 2008. Comparative analysis of human and canine *Campylobacter upsaliensis* isolates by amplified fragment length polymorphism. J. Clin. Microbiol., 46: 1504-1506.

Engvall, E.O., B. Brandstrom, L. Andersson, V. Baverud, G. Trowald-Wigh and L. Englund, 2003. Isolation and identification of thermophilic *Campylobacter* species in faecal samples from Swedish dogs. Scand. J. Infect. Dis., 35: 713-718.

Fox, J.G., 1990. Campylobacteriosis. In: Infectious Disease of the Dog and Cat, Greene, C.E. (Ed.). WB Sauders, Philadelphia, PA, USA., pp: 538-542.

Fox, J.G., R. Moore and J.I. Ackerman, 1983. *Campylobacter jejuni*-associated diarrhea in dogs. J. Am. Vet. Med. Assoc., 183: 1430-1433.

Gracia, M.M., H. Lior, R.B. Stewart, G.M. Ruterbauer, J.R. Trudel and A. Skljarevski, 1985. Isolation, characterization and serotyping of *Campylobacter jejuni* and *Campylobacter* coli from slaughter cattle. Applied Environ. Microbiol., 49: 667-672.

Guest, C.M., J.M. Stephen and C.J. Price, 2007. Prevalence of *Campylobacter* and four endoparasites in dog populations associated with hearing dogs. J. Small Anim. Prac., 48: 632-637.

Hald, B. and M. Madsen, 1997. Healthy puppies and kittens as carriers of *Campylobacter* sp., with special reference to *Campylobacter upsaliensis*. J. Clin. Microbiol., 35: 3351-3352.

Hald, B., K. Pedersen, M. Waino, J.C. Jorgensen and M. Madsen, 2004. Longitudinal study of the excretion patterns of thermophilic *Campylobacter* spp. in young pet dogs in Denmark. J. Clin. Microbiol., 42: 2003-2012.

Kapperud, G., E. Skjerve, N.H. Bean, S.M. Ostroff and J. Lassen, 1992. Risk factors for sporadic *Campylobacter* infections: Results of a case-control study in Southeastern Norway. J. Clin. Microbiol., 30: 3117-3121.

Koene, M.G.J., D.J. Houwers, J.R. Dijkstra, B. Duim and J.A. Wagenaar, 2004. Simultaneous presence of multiple *Campylobacter* species in dogs. J. Clin. Microbiol., 42: 819-821.

Korman, T.M., C.C. Varley and D.W. Spelman, 1997. Acute hepatitis associated with Campylobacter jejuni bacteremia. Eur. J. Clin. Microbial. Infectious Dis., 16: 678-681.

Kulkarni, S.P., S. Lever, J.M. Logan, A.J. Lawson, J. Stanley and M.S. Shafi, 2002. Detection of *Campylobacter* sp. A comparison of culture and polymerase chain reaction based methods. J. Clin. Pathol., 55: 749-753.

Labarca, J.A., J. Sturgeon, L. Borenstein, N. Salem and S.M. Harvey *et al*., 2002. *Campylobacter upsaliensis*, another pathogen for consideration in the United States. Clin. Infect. Dis., 34: 59-60.

Lastovica, A.J. and E.L. Roux, 2003. Prevalence and optimal detection of *C. Upsaliensis* in stool specimens. Clin. Infect. Dis., 36: 1624-1625.

Morse, E.V. and M.A. Duncan, 1975. Canine salmonellosis: Prevalence, epizootiology, signs and public health significance. J. Am. Vet. Med. Assoc., 167: 817-820.

Nair, G.B., R.K. Sarkar, S. Chowdhury and S.C. Pal, 1985. *Campylobacter* infection in domestic dogs. Vet. Rec., 116: 237-238.

Olson, P. and T. Sandsted, 1987. *Campylobacter* in the dog: A clinical and experimental study. Vet. Rec., 121: 99-101.

Parsons, B.N., C.J. Porter, R. Ryvar, J. Stavisky and N.J. Williams *et al*., 2010. Prevalence of *Campylobacter* spp. in a cross-sectional study of dogs attending veterinary practices in the UK and risk indicators associated with shedding. Vet. J., 184: 66-70.

Robinson, R.A. and R.N. Pugh, 2002. Dogs, zoonoses and immunosuppression. J. Royal Soc. Med., 122: 95-98.

Rossi, M., M.L. Hanninen, J. Revez, M. Hannula and R.G. Zanoni, 2008. Occurrence and species level diagnostics of *Campylobacter* spp., enteric *Helicobacter* spp. and *Anaerobiospirillum* sp. in healthy and diarrheic dogs and cats. Vet. Microbiol., 129: 301-314.

Sandberg, M., B. Bergsjo, M. Hofshagen, E. Skjerve and H. Kruse, 2002. Risk factors for *Campylobacter* infection in Norwegian cats and dogs. Prev. Vet. Med., 55: 241-253.

Skirrow, M.B. and J. Benzamin, 1980. Differentiation of enteropathogenic *Campylobacter*. J. Clin. Pathol., 33: 1122-1124.

Snececor, G.W. and W.G. Cochran, 1980. Statistical Methods. Oxford and IBH Publishing Co., Calcutta.

Sorvillo, F.J., L.E. Lieb and S.H. Waterman, 1991. Incidence of campylobacteriosis among patients with AIDS in Los Angles country. J. Acquired Immunodeficiency Syndrome Human Retrovirus, 4: 598-602.

Tenkate, T.D. and R.J. Stafford, 2001. Risk factors for *Campylobacter* infection in infants and young children: A matched case-control study. Epidemiol. Infect., 127: 399-404.

Torre, E. and M. Tello, 1993. Factors influencing fecal shedding of *Campylobacter jejuni* in dogs without diarrhea. Am. J. Vet. Res., 54: 260-262.

Tsai, H.J., H.C. Huang, C.M. Lin, Y.Y. Lien and C.H. Chou, 2007. Salmonellae and *Campylobacters* in household and stray dogs in Northern Taiwan. Vet. Res. Commun., 31: 931-939.

Wieland, B., G. Regula, J. Danuser, M. Wittwer, A.P. Burnens, T.M. Wassenaar and K.D. Stark, 2005. *Campylobacter* spp. in dogs and cats in Switzerland, risk factor analysis and molecular characterization with AFLP. J. Vet. Med. B Infect. Dis. Vet. Public Health, 52: 183-189.

Workman, S.N., G.E. Mathison and M.C. Lavoie, 2005. Pet dogs and chicken meat as reservoirs of *Campylobacter* species in Barbados. J. Clin. Microbiol., 43: 2642-2650.