Annals of Microbiology and Infectious Diseases
Volume 2, Issue 3, 2019, PP 21-25
ISSN 2637-5346

Prevalence of *Campylobacter* Species in Dogs in Bassa, Plateau State, Nigeria

Olabode Mayowa Peter[1], Ogbu Kenneth Ikejiofor[2*], Sabo, Jibreel Abdullahi[2]Anjili Waziri Ibrahim[1], Maimadu Abdullahi Audu[2], Tion Matthew Terzungwe[3], Olaolu Olushola Samuel[4], Yusuf Danjuma Yola[2], Okonkwo Rosita Amaka[1], Malgwi Rhoda Ishaku[1]

[1]National Veterinary Research Institute Vom, Plateau state, Nigeria
[2]Department of Animal Health, Federal College of Animal Health and Production Technology Vom, Plateau State, Nigeria
[3]Department of Veterinary Medicine, College of Veterinary Medicine, Federal University of Agriculture Makurdi, Benue state, Nigeria
[4]Department of Veterinary Microbiology, Faculty of Veterinary Medicine, Ahmadu Bello University Zaria, Kaduna state, Nigeria

***Corresponding Author:** Ogbu Kenneth Ikejiofor, Department of Animal Health, Federal College of Animal Health and Production Technology Vom, Plateau State, Nigeria, Email: kenike_mary@yahoo.com*

ABSTRACT

The study was conducted to determine the prevalence of Campylobacter species in fecal sample of dogs in Bassa Local Government Area of Plateau State. A total of 105 fecal samples were collected from dogs, 35 samples from each of the three Districts of area. Standard bacteriological assay was carried out for Campylobacter species determination. The study revealed that 15(14.3%) fecal samples out of 105 contained Campylobacter species, the study indicated that there was statistical significant association between age prevalence and Campylobacter infection in the study area (P<0.05) while sex, breed and location indicated no statistical significant association with the prevalence Campylobacter infection (P>0.05). The presence of Campylobacter species in dogs may play a role as food borne pathogen of importance. There is a risk of human acquiring zoonotic Campylobacter infection from their dogs especially the companion dogs. Dog owners and veterinarians as well must observed strict hygiene in dog's management and handling to protect the dogs, themselves and the general public from Campylobacter infection.

Keywords: *Campylobacter species, Fecal sample, Dogs, Bassa, Zoonosis*

INTRODUCTION

Dogs are the most primitive companion of man and have been domesticated as early as 8000BC [1]. They are used for several purpose including sports, hunting, guide, security, companionship, food, recreational purposes, biochemical research and model to study human disease. This is because they share many biochemical and physiological characteristic e.g. with human [2]. However, these dogs kept for business, food, security, companionship (pet) and many other purposes have been suffering from dreadful disease which include Canine parvovirus enteritis, Rabies, Kennel cough, Babesiosis, Trypanosomosis, Lieshmaniasis and Campylobacteriosis among many others [1].

Campylobacter species are gram negative, micro-acrophilic, curved or spiral rods bacteria in the family *Campylobacteriacea* and *Campylobacter* species are ubiquitous [3]. Campylobacter is a leading bacteria cause of food-borne diarrhea illness worldwide [4]. The handling or consumption of undercooked/ contaminated meat (especially poultry) is considered to be the significant source of human Campylobacter infection [5]. *Campylobacter* species are widely spread around across the world, natural reservoirs of the bacteria are the gastrointestinal tract of farm and wild animals, direct contact with carrier animals was found to be a possible source of the infection [6]. Diagnosis is by isolation and identification in the laboratory from feces is primary plating on selective media and incubation at 42^0C in a microaecrobic atmosphere, the conventional identification scheme for *Campylobacter* is based on classical phenotypic characteristic, such as morphological appearance, biochemical reactions, and growth temperature and tolerance [7]. The risk of infection by *Campylobacter* can

be reduced by avoiding untreated water, raw animal's products particular poultry, unpasteurized milk, undercooked chicken meat and good hygiene will keep the organism away [3].

A result of survey indicates a high prevalence of contamination with *Campylobacter* in poultry meat in Sokoto, Nigeria the prevalence of Campylobacter (81.9%) observed in this study [6].

A survey of *Campylobacter* species in cats and dogs on north-western Nigeria was conducted and show a prevalence rate of 27.7% and 18.3%, respectively. The finding from this study indicate that there was no statistically significant association between age groups and *Campylobacter* infection in dogs. Similarly, no statistical significant associate was observed between sexes of both dogs and cats and *Campylobacter* infection, the predominant *Campylobacter* species found in the study was *C. upsaliensis* which accounted for 74.4% and 89.5% in dogs and cats respectively, the second most common specie isolate was *C. jejuni* which account for 23.1% and 21.1% in dogs and cats respectively [6]. The role of *C. upsaliensis* as a human enteric pathogen has been question. However, it has been isolated from many cases with gastroenteritis and has been confirmed as the cause of an outbreak in day care centers in Brussels. *C. upsaliensis* has been reported to the most frequently isolated *Campylobacter* specie in human after *C. jejuni* [8].

Campylobacter is one of the leading cause of gastroenteritis in humans and animals, also known as the common bacteria cause of foodborne enteritis [3]. The major routes of transmission in human is consumption of contaminated or undercooked meat (especially poultry) [6] and most of our local dogs are fed with poultry carcass, and some dogs (stray dogs) feed on raw poultry death carcass which stand on high chance of infection with the organism and humans consume dog meat.

Campylobacter species particularly *C. jejuni, C. coli* and *C. upsaliensis* are a major cause of enteritis in human [3]. Living with dogs has been documented to be a specific risk factor for *Campylobacter* infection [9]. There is paucity of information in the prevalence of *Campylobacter* infection in the study area. A survey on the prevalence of *Campylobacter* in dogs therefor becomes a necessity as it is a zoonotic agent.

MATERIALS AND METHOD

Study Area/Design

The research work which adopted a survey and experimental design was carried out in three Districts of Bassa Local Government Area of Plateau State, Nigeria (Pengana, Rukuba and Irigwe).

Materials

Agar, Blood (sheep), Petri dishes, staining rack, distilled water, wire loop, Bunsen burner, incubator, autoclave, glass slide, microscope, hand gloves, laboratory coat, feces (dog), syringes, weighing scale, filter paper.

Sample Collection

A total of 105 fecal samples from dogs were collected (35 from each of the three District) using disposable hand gloves per rectum. The samples were transported to microbiology laboratory of Federal College of Animal Health and Production Technology Vom for analysis.

Blood Agar Preparation

Using the manufacture instructions with little modification, 18mls of nutrient was prepared by weighting a certain grams of nutrient agar powder and dissolved in 18mls of distilled water, it was sterilized on autoclave at 121^0C for 15minutes, and then it was removed and allowed to cool. Using sterile syringe, 2mls of sterile sheep blood was added to 18mls nutrient agar and swell to mix well then it was poured on the sterile petri dish [10].

Filtration Techniques to Recover *Campylobacter*

About 1g of feces was emulsified in 10mls of sterile saline and allowed to settled for 2minutes, A filter membrane of 0.45Nm porosity, 47mm diameter was placed on a plate of blood agar chocolate (heated blood) agar. Ten drops of fecal suspension were added to the filter, making sure the suspension does not over run beyond the edge of the filter, the filter was removed and discarded 30-60 minutes after applying the suspension [11].

Culture Method

After the filtration techniques to recover campylobacter, the blood agar plates were incubated at 42^0C for 48hrs at micro-aerobic condition for distinct colonies [11]. Suspected colonies were gram stained and examined.

Data Analysis

Descriptive statistic was used to determine the prevalence of *Campylobacter* specie in dogs in the study area. Chi square (X^2) was also used to

determine the statistical significant difference in relation to age, sex, breed and location.

RESULTS

Colony of Campylobacter Specie on Blood Agar

The suspected colonies were grey-white or creamy-grey in color and moist in appearance which often appeared as a layer of growth over the surface of the agar.

Microscopic Examination

Gram negative, microaerophilic, curved (comma) or spiral, rods, ("S") or "gull wing" shapes, non-spore forming and motile with a single polar flagellum was observed

Table1. *Showing Prevalence of Campylobacter Species in Dogs in Bassa, Plateau State based on Age Distribution*

Age (Year)	Sample	Positive	Prevalence (%)
Less than one	77	6	7.80
One and above	28	9	33.0

(X^2 = 21.587, df = 6, p = 0.001).

From table above, x^2 = Chi-square,

df = Degree of freedom and

p = Level of statistical significance.

Table2. *Showing Prevalence of Campylobacter Species in Dogs in Bassa, Plateau State based on Sex Distribution*

Sex	Sample	Positive	Prevalence (%)
Male	45	7	15.6
Female	60	8	13.3

(X^2 = 0.104, df = 1, p = 0.747).

From table above, x^2 = Chi-square,

df = Degree of freedom and

p = Level of statistical significance.

Table3. *Showing Prevalence of Campylobacter Species in Dogs in Bassa, Plateau State based on Breed Distribution*

Breed	Sample	Positive	Prevalence (%)
Exotic	13	3	23.1
Local	92	12	13.0

(X^2 = 0.936, df = 1, p = 0.333)

From table above, x^2 = Chi-square,

df = Degree of freedom and

p = Level of statistical significance.

Table4. *Prevalence of Campylobacter Species in Dogs in Bassa, Plateau State based on Geographical Location*

Location	Sample	Positive	Prevalence (%)
Pengana	35	6	17.1
Irigwe	35	4	11.4
Rukuba	35	5	14.3

(X^2 = 0.467, df = 2, p = 0.792)

From table above, x^2 = Chi-square,

df = Degree of freedom and

p = Level of statistical significance.

DISCUSSION

The finding from this study indicated that there was statistical significant associated between age groups and *Campylobacter* infection in dogs ($p<0.05$). The higher infection rates observed in the adult may not be unconnected with the increased scavenging activities associated with adult dogs. Holmberg *et al.* (16) reported higher prevalence in young dogs in Denmark in contrast with the present findings. Similarly, previous studies [5; 12] also found out that younger dogs rather than older dogs were more likely to carry *Campylobacter* species suggesting the consequence of age-related

immunity. However, small number of reports [13; 14] have suggested that age is not a predisposing factor for *Campylobacter* infection.

The findings from this study indicated that there was no statistical significant association between sex and *Campylobacter* infection ($p>0.05$) not in line with other reports [15] in which female dogs recorded significant higher prevalence than male probability due to the stress associated with hormonal imbalance during pregnancy and lactation which usually increase female susceptibility to infections.

The finding from this study also indicated no statistical significant association between breeds and *Campylobacter* infection ($p>0.05$) disagreeing with previous study reports [16] which indicated significant variation with higher infection rate among hunting (Local) dogs, that may not be unconnected to continuous exposure to wild life reserves. Also, guard local dogs are commonly left to scavenge exposing them to the risk of acquiring infection from dumping sites.

Similarly, no statistical significant association was observed between location and *Campylobacter* infection in the study area. ($p>0.05$).

CONCLUSION

In conclusion, the findings from this study indicated that there was low prevalence of *Campylobacter* specie in dogs in the study area i.e. 15(14.3%) of 105 samples collected. The study also revealed that age has statistical significant association with *Campylobacter* infection ($p<0.05$) while Sex, Breed and Location has no statistical significant association with *Campylobacter* infection ($p>0.05$). There is the risk of human acquiring zoonotic *Campylobacter* infection from their dogs especially the companion dogs and dog meat.

RECOMMENDATION

On the basis of this research findings, formation and implementation of specific control procedures (hygiene) is strongly recommended in order to improve the protection of the public against *Campylobacter* infection.

REFERENCES

[1] Oyeyemi MO, Adetunji VO, Ogundipe GA, Bablobi OO, The prevalence of reproductive condition in dogs in Edo state Nigeria. *Proceeding of the 19th Symposium of international society of Veterinary Epidemiology and Economics* 2000: Aug. 6-11, Breckenridge Colorado. USA .1063-1065.

[2] Johnson PD, Dogs in biomedical research. Unpublished lecture notes, Assistance veterinary specialist, University of Arizoba Tukon. 1999 18-27.

[3] Gras LM, Smid, JH, Wagenaar JA, Koene MG, Havelaar AH, Friesema IH, French NP, Flemming C, Galson JD, Graziana C, Busani L, Van W, Increase risk of *Campylobacter jejuni* and *Campylobacter coli* infection of pet origin in dogs owners and evidence for genetic association between strains causing infection in human and their pets. *Epidemiology infection.* 2013: 28: 1-10.

[4] Zhao C, Ge B, DeVillena J, Sudler R, Yeh E, Zhao S, White DG, Wangner D, Meng J, Prevalence of *Campylobacter* species and *Salmonellaserovars* in retail chicken, turkey, pork and beef from the greater Washington D.C area. *Journal of Applied Environmental Microbiology*. 2010:67(12): 5431-6.

[5] Acke E, Caroll C, O'Leary A, McGill K, Lawlor A, Madden RH, Moran L, Scates P, McNamara E, Moore JE, Jones BR, Fannings S, White P, Genotype characterization and cluster analysis of *Campylobacter jejuni* isolate from domestic pets, human clinical cases and retail food. *Veterinary Journal*. 2011: 64(6): 115-120.

[6] Salihu MD, Magaji AA, Abdulkadir JU, Kolawale A, Survey of thermophilic *Campylobacter* species in cats and dogs in north-west Nigeria. *Journal of Veterinary Science*. 2010:46: 425-430.

[7] Ke B, Re L, Wu S, Deng X, Ke C, Feng Z, Survey of physician diagnostic and treatment practices for patients with acute diarrhea in Guangdong province, china. *Foodborne Pathogen Disease*. 2012: 9(1): 47-53.

[8] Goossens H, Waes L, DeBoeck MP, Kersters K, Butzler JP, Vandamme P, Is '*Campylobacter upsaliensisn'* an unrecognized cause of human diarrhea. *Lancet.*1995:335: 584-586.

[9] Hald B, Pederson K, Wainz M, Jzrgensen JC, Madsen M, Longitudinal study of the excretion patterns of thermophilic *Campylobacter* species in young pet dog in Denmark. *Journal of Clinical Microbiology*. 2004:42: 2003-2012.

[10] Anueyiagu KN, Microbiology practical manual (unpublished) for higher diploma. *Reversed edition.* 2014: 9-10.

[11] Cheesbrough M, District laboratory practices in tropical countries. Published by Cambridge university press London Low price edition. 2000: 63-70.

[12] Guest CM, Stephen JM, Price CJ, Prevalence of *Campylobacter* and four endo-parasite in dog population's associates with hearing dogs.

Journals of Small Animal Practical. 2007:48: 632-637.

[13] Wieland BG, Regular J, Danuser M, Witter AP, Burners TM, Wassenear D, Stark K, *Campylobacter* species in dogs and cats in Switzerland, risk factor analysis and molecular characterization with AFTP. *Journal of Veterinary medical biological infection.* 2005:52: 183-189.

[14] Tsai HJ, Hung CM, Lin YY, Lien C, Chou H, *Salmonella* and *Campylobacter* in household and stray dogs in Northerners Taiwan. *Veterinary Research Community*. 2007: 31: 931-939.

[15] Karshima SN, Bobbo AA, Isolation and PCR characterization of thermophilic *Campylobacter* species in dogs presented to selected veterinary clinics in Jos, Nigeria. *Alexandria Journal of Veterinary sciences.* 2016:50(1): 70-77.

[16] Holmberg M, Rosendal T, Engrall EO, Ohlson A, Lindberg A, Prevalence of thermophilic *Campylobacter* specie in Swedish dogs and characterization of *C. jejuni* isolate. *Journal of Veterinary Science*. 2015:57(19): 13028-14015.

Citation: *Olabode Mayowa Peter et.al, "Prevalence of Campylobacter Species in Dogs in Bassa, Plateau State, Nigeria", Annals of Microbiology and Infectious Diseases 2(3), 2019, pp.21-25.*