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Mini Review

Wild Birds as Possible Source of *Campylobacter Jejuni*

Mohamed-Yousif Ibrahim Mohamed*

Department of Veterinary Medicine, College of Food and Agriculture, United Arab of Emirates University, United Arab Emirates

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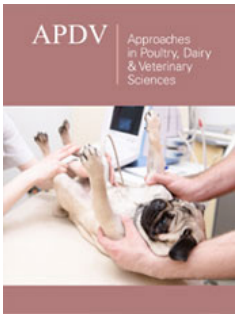

***Corresponding author:** Mohamed-Yousif Ibrahim Mohamed, Department of Veterinary Medicine, College of Food and Agriculture, United Arab of Emirates University, United Arab Emirates

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Abstract

Wild birds are reported to be frequently infected with *Campylobacter jejuni*. It is well recognized that *Campylobacter jejuni* is one of the main causes of gastroenteritis in humans, and poultry meat is reported to be the main source. Many studies had shown the occurrence of *Campylobacter jejuni* in animal farms in particular poultry farms and animal products. Wild birds were observed in abundance at marketplaces, residential areas, and farms. It was reported that wild birds may harbor and transmit *Campylobacter jejuni* to farm animals and residential areas. This review simply describes the possibility of wild birds spreading *Campylobacter jejuni* in the environment.

Keywords: *Campylobacter jejuni*; Wild birds; Animal farms; Residential areas

Introduction

A variety of pathogens that are transmissible to humans or domestic animals, such as *salmonella*, *shigella*, and *Campylobacter jejuni*, can be found in free-living wild birds like the migratory birds that play an important role as long-distance vectors [1,2]. The wild birds usually stay together in different broad groups and might have a role in *Campylobacter jejuni* infection in both humans and domestic animals. After a survey, it was reported that wild birds are an essential source of introduction of *Campylobacter jejuni* to residential areas, such as eateries, human houses, and children's playgrounds, as well as animal farms by contaminating the soil, feed, and water [3]. Wild birds are important with regard to the prevalence of *Campylobacter jejuni* in several different ways: 1) As potential spreaders of *Campylobacter jejuni* through the ability to migrate long distances in short periods of time. 2) As sentinels, mirroring human activity and its influence on the environment because of the diverse ecological niches of birds, and as they easily pick up human and environmental bacteria. 3) As a reservoir and melting pot of *Campylobacter jejuni*. In California in the United States, a high occurrence of *Campylobacter jejuni* at 66.9% (85/127) among crow feces has been detected in residential areas [4]. Also, Abdollahpour et al. [3] in Iran, and French et al. [5] in New Zealand, detected *Campylobacter jejuni* from wild birds in children's playgrounds at 17.5% out of 200 and 12.5% out of 192, respectively; these birds could contaminate the environment and thereby enable it to be transmitted to children.

The occurrence of *Campylobacter jejuni* has been shown to be significantly higher in wild birds from the Medes Islands where eight birds (10.7%) compared to the Columbretes Islands, which only one wild bird (1.4%) was found positive for *Campylobacter jejuni* [6]. The authors reported that wild birds in the former islands obtained their food from waste while the wild birds in the Columbretes islands ate mostly fish, thus, different feeding habits affect the presence of *Campylobacter jejuni* in wild birds. A study in Malaysia by Mohamed

Yousif et al. [1] found that the birds sampled near the housing area exhibited *Campylobacter jejuni* and only Rock Pigeon (*Columba livia*) was playing a significant factor as a source of *Campylobacter jejuni* in this area. This could be due to that; the pigeon had the feed, which ranged from vegetation to human garbage that was probably contaminated with *Campylobacter jejuni*. Some studies suggested that wild birds could get infected with *Campylobacter* from the river water and other surface water. According to Dyke et al. [7], the study showed 30% *Campylobacter jejuni*, 9% *Campylobacter coli* and 66% *Campylobacter lari* were found in river water samples. The reason for such a rate is probably due to high moisture coupled with low temperature along the river shores. Also, infected animals in farms excrete *Campylobacter jejuni* in feces thereby contaminating the farms environment, which can be the source of *Campylobacter jejuni* to the wild birds. According to numerous studies in different animal farms, such as pig [8], cattle (Sanad et al. 2011), sheep [9], goats [10] and poultry [1] they showed that these animal farms play an important role in contamination of the environment. In addition, it was found that insectivorous birds, like the Blue-tailed Bee-eater (*Merops philippinus*) and the Large-tailed Nightjar (*Caprimulgus macrurus*), were colonized by *Campylobacter jejuni*. The insects they feed on may carry the organisms. Beetles and flies have been shown to be carrying *Campylobacter jejuni* [11]. On the other hand, Sensale et al. [12] did not isolate *Campylobacter jejuni* from the insectivorous birds. It is possible that the difference in results between these studies is associated with the migratory nature of the birds. According to Mohamed Yousif et al. [1], in Selangor, Malaysia, the occurrence of *Campylobacter jejuni* in Eurasian tree sparrows (*Passer montanus*), Rock Pigeons (*Columba livia*) and Spotted dove (*Spilopelia chinensis*) in residential areas has been shown to be 22.1%, and *Campylobacter spp.* in wild birds near poultry farms has been shown to be 18.6%; *Campylobacter jejuni* was the dominant species of the isolates. Investigations into the relationship of the molecular characterization of *Campylobacter jejuni* strains in wild birds, as well as in humans and domestic animals for tracking the road of transmission of *Campylobacter jejuni* are scant in Malaysia.

Griekspoor et al. [13] detected a widespread variety in the molecular characterization of *Campylobacter jejuni* strains acquired from wild birds in Sweden, as suggested also by several other studies [14,15]. Also, Marotta et al. [16] in Italy, detected possessing a minor set of *Campylobacter jejuni* sequence typing strains shared with further poultry, livestock, and humans using Multilocus Sequence Typing (MLST). According to a study by Aksomaitiene et al. [14], the results support the idea that not only poultry products but also wild birds and cattle may be a reservoir of *Campylobacter jejuni* and stipulate a risk of spread. In Finland, Because of a high frequency of novel *Campylobacter jejuni* sequence typing strains and *Campylobacter jejuni* sequence typing strains only rarely detected among broiler batches and human patients, western jackdaws are considered to be rare sources of *Campylobacter jejuni* infection in humans and of contamination of animal farms. Although the *Campylobacter jejuni* sequence typing strains among mallard ducks and western jackdaws showed interrelatedness, they may have the ability to transfer to animal farms and residential areas [17]. Moreover, in the United States, the molecular characterization of *Campylobacter jejuni* strains implicated wild birds as the source of *Campylobacter jejuni* outbreaks in humans associated with the consumption of fresh peas [14]. However, according to a report of a study conducted in Italy, the molecular characterization of *Campylobacter jejuni* strains from wild birds sampled near dairy farms was not responsible for the spreading of *Campylobacter jejuni* among cattle on the farms, and did not play a role in milk contamination [18]. It has been reported that different types of wild birds (such as pigeons, crows, and gulls) frequently stay in large numbers, and, hence, would be a probable source of spreading the organisms [19,20]. After a survey, the bird droppings are suggested to be a vehicle for the introduction of *Campylobacter jejuni* to residential areas, such as eateries in the village environment, children's playgrounds (contaminates the moist surfaces) [3-5], and human houses (backyard).

Conclusion

Wild birds are able to spread *Campylobacter jejuni* strains from animal farms to different environments, and, at the same time, these birds are able to bring *Campylobacter jejuni* to the animal farms environment. In this review, the evidence presented points out that *Campylobacter jejuni* isolated from human patients, animal farms and products, the environment, and wild birds showed interrelatedness among their sequence type strains. To address the question of whether isolates from wild birds are a source of contamination in animal farms and residential areas, there is a need to characterize the isolates by molecular typing. Further study certainly needs to be done on molecular typing of *Campylobacter jejuni* in animal farms, animal products, residential areas, and wild birds and requires investigation into wild birds role in the transmission and spread of *Campylobacter jejuni*.

References

1. Yousif M, Mohamed I, Aziz A, Saleha, Abu, et al. (2019) Occurrence of antibiotic resistant *campylobacter* in wild birds and poultry. Malays J Microbiol 15(2): 143-151.
2. Tardón A, Bataller E, Llobat L, Jiménez Trigos E (2021) Bacteria and antibiotic resistance detection in fractures of wild birds from wildlife rehabilitation centres in Spain. Comp Immunol Microbiol Infect Dis 74.
3. Abdollahpour N, Zendehbad B, Alipour A, Khayatzadeh J (2015) Wild-bird feces as a source of *Campylobacter jejuni* infection in children's playgrounds in Iran. Food Control 50: 378-381.
4. Weis AM, Miller WA, Byrne BA, Chouicha N, Boyce WM, et al. (2014) Prevalence and pathogenic potential of *campylobacter* isolates from free-living, human-commensal American crows. Appl Environ Microbiol 80(5): 1639-1644.
5. French NP, Midwinter A, Holland, B, Collins Emerson J, Pattison R, et al. (2009) Molecular epidemiology of *Campylobacter jejuni* isolates from wild-bird fecal material in children's playgrounds. Appl Environ Microbiol 75(3): 779-783.
6. Ramos R, Cerdà Cuéllar M, Ramírez F, Jover L, Ruiz X (2010) Influence of refuse sites on the prevalence of *Campylobacter* spp. and *Salmonella* Serovars in seagulls. Appl Environ Microbiol 76(9): 3052-3056.
7. Dyke MIV, Morton VK, McLellan NL, Huck PM (2010) The occurrence of *Campylobacter* in river water and waterfowl within a watershed in southern Ontario, Canada. J Appl Microbiol 109(3): 1364-5072.

8. Marotta F, Marcantonio L, Janowicz A, Pedonese F, Donato G, et al. (2020) Genotyping and antibiotic resistance traits in *Campylobacter jejuni* and coli from pigs and wild boars in Italy. Frontiers in cellular and infection microbiology 10.

9. Ocejo M, Oporto B, Hurtado A (2019) Occurrence of *Campylobacter jejuni* and *Campylobacter coli* in cattle and sheep in northern Spain and changes in antimicrobial resistance in two studies 10-years apart. Pathogens 8(3): 98.

10. Quinn EM, Slattery H, Walsh D, Joshi L, Hickey RM (2020) *Bifidobacterium longum* subsp. infantis ATCC 15697 and goat milk oligosaccharides show synergism *in vitro* as anti-infectives against *Campylobacter jejuni*. Foods 9(3): 348.

11. Strother KO, Steelman CD Gbur EE (2005) Reservoir competence of lesser mealworm (*Coleoptera*: *Tenebrionidae*) for *Campylobacter jejuni* (Campylobacterales: *Campylobacteraceae*). J Med Entomol 42(1): 42-47.

12. Sensale M, Cuomo A, Dipineto L, Santaniello A, Calabria M, et al. (2006) Survey of *Campylobacter jejuni* and *Campylobacter coli* in different taxa and ecological guilds of migratory birds. Ital J Anim Sci 5(3): 291-294.

13. Griekspoor P, Colles FM, McCarthy ND, Hansbro PM, Ashhurst Smith C, et al. (2013) Marked host specificity and lack of phylogeographic population structure of *Campylobacter jejuni* in wild birds. Mol Ecol 22(5): 1463-1472.

14. Aksomaitiene J, Ramonaite S, Tamuleviciene E, Novoslavskij A, Alter T, et al. (2019) Overlap of antibiotic resistant *Campylobacter jejuni* MLST genotypes isolated from humans, broiler products, dairy cattle and wild birds in Lithuania. Front Microbiol 10: 1377.

15. Kwan PSL, Xavier C, Santovenia M, Pruckler J, Stroika S, et al. (2014) Multi-locus sequence typing confirms wild birds as the source of a *Campylobacter* outbreak associated with the consumption of raw peas. Appl Environ Microbiol 80(15): 4540-4546.

16. Marotta F, Janowicz A, Marcantonio L, Ercole C, Donato G, et al. (2020) Molecular characterization and antimicrobial susceptibility of *Campylobacter jejuni* isolates from Italian wild bird populations. Pathogens 9(4): 304.

17. Kovanen S, Rossi M, Pohja Mykr*ä* M, Nieminen T, Raunio-Saarnisto M, et al. (2019) Population genetics and characterization of *Campylobacter jejuni* isolates from western jackdaws and game birds in Finland. Appl Environ Microbiol 85(4).

18. Bianchini V, Borella L, Benedetti V, Parisi A, Miccolupo A, et al. (2014) Prevalence in bulk tank milk and epidemiology of *Campylobacter jejuni* in dairy herds in Northern Italy. Appl Environ Microbiol 80(6): 1832-1837.

19. Mohamed-Yousif IM (2019) Occurrence of Campylobacter Jejuni in Poultry Meats. Nov Res Sci 8(1).

20. Mohamed-Yousif I M (2021) Occurrence of Antimicrobial Resistance in Foodborne Bacteria (Campylobacter and E. coli): A Food Safety Issue and Public Health Hazard. Nutri Food Sci Int J, 11(1).