Pet ownership as a risk for human campylobacteriosis- A review

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SUMMARY

This paper aims to emphasize the need to update our knowledge on the prevalence of *Campylobacter* spp. in dogs and cats and their role as possible sources of human campylobacteriosis especially in Africa and highlights the importance of the 'One Health' approach in investigating and responding to this zoonotic disease. Dogs and cats are among the most popular companion animals in many parts of the world including Africa. Despite the benefits, pet ownership is considered a risk factor for campylobacteriosis in humans. *Campylobacter jejuni*, *C. upsaliensis* and *C. helveticus* are the predominant *Campylobacter* spp. in dogs and cats that are considered sources of *Campylobacter* infection for humans. The fecal- oral route is the main route of transmission. Transmission of antibiotic-resistant *Campylobacter* infections can also occur from pets to humans. There is a need for greater public health awareness surrounding the zoonotic nature of *Campylobacter* infections and the susceptibility of pets and their owners to this infection. There needs to be collaboration between medical, veterinary and public health professionals as encouraged by the "One Health" approach, to identify, control and prevent *Campylobacter* transmission between pets and humans.

Keywords: pets, human campylobacteriosis, one health

INTRODUCTION

Campylobacter spp. are among the leading zoonotic pathogens causing gastroenteritis in many countries throughout the world (EFSA, 2011). Most infections are caused by thermotolerant *Campylobacter jejuni* followed by *C. coli*, *C. upsaliensis* and other species (Labarca *et al*., 2002, Lastovica and Le Roux, 2003; Leahly *et al*., 2016). Handling or consuming contaminated/undercooked meat (especially poultry) are the most important sources of human campylobacteriosis (Adak *et al*., 2005; Strother *et al*., 2005; Hermans *et al*., 2012; Sahin *et al*., 2015). However, pet ownership is considered a risk factor for campylobacteriosis in humans (Siemer *et al*., 2004; Koene *et al*., 2004; Karenlampi *et al*., 2007; Mughini *et al*., 2013). Approximately 9% of human campylobacteriosis cases are due to contact with pets (Rossi *et al*., 2008; Tam *et al*., 2009; Kittl *et al*., 2013).

Campylobacter jejuni, *C. upsaliensis* and *C.helveticus* are the predominant *Campylobacter* spp. in dogs and cats (Workman *et al*., 2005; Parsons *et al*., 2010). Although the majority of dogs and cats may be subclinically infected, some will develop mild to moderate enteritis (Chaban *et al*., 2010; Weese *et al*., 2011; Acke, 2018). Animals less than one year are more often colonized than older animals (Parsons *et al*., 2010; Carbonero *et al*., 2012; Amar *et al*., 2014). Kenneled animals and immunosuppressed animals are also predisposed to *Campylobacter* infection that leads to development of clinical signs (Acke, 2018).

The prevalence of *Campylobacter* spp in dogs and cats among recent studies from

different developed countries ranges from 3-37% and 7-25% respectively (Giacomelli *et al*., 2015; Holmberg *et al*., 2015; Mohan 2015; Lazou *et al*., 2016; Polzer *et al*., 2018; Torkan *et al*., 2018). In Africa, Komba (2018) reported a prevalence of 9.9% in dogs in Tanzania whereas in Nigeria, Salihu *et al.* (2010) reported a prevalence of 27.7% and 18.3% in dogs and cats respectively. Investigating the prevalence of *Campylobacter* in dogs and cats is an important step in the understanding of their role as a possible source of human campylobacteriosis (Giacomelli *et al*., 2015).

Pet ownership as a significant risk factor for campylobacteriosis

There are physical, psychological, and social benefits in human-pet relationships, especially for dog and cat owners (Allen, 2003). Due to their close contact, dogs and cats are considered as among the major sources of *Campylobacter* infection for humans (Fox, 2006; Labarca *et al*., 2002; Kittl *et al*., 2013; Mughini *et al*., 2013).

Presence of puppies in the household has been identified as risk factor for campylobacteriosis, particularly in young children (Tenkate *et al*., 2001; Mughini *et al*., 2013). A study by Wolfs *et al*. (2001) showed evidence of transmission of *C. jejuni* from a dog to a 3-week old infant. Transmission of the *Campylobacter* spp. can also be from infected humans to pets. A study by Damborg *et al*. (2004) showed that *C. jejuni* can occur among pets living with human patients infected with *C. jejuni*, especially children.

Pets can contribute to the dissemination of this pathogen in the environment. Pets can shed *Campylobacter* for over 1 year (Hald *et al*., 2004) and usually do not show clinical symptoms (Engvall *et al*., 2003; Acke, 2018). Pet animals play a crucial role in the propagation of this pathogen especially in urban areas where direct pet-to-pet contact or exposure to feces from other pets is likely to occur (Damborg *et al*., 2004).

The awareness of the risk of *Campylobacter* spp. infection from pets especially dogs and cats may be an important way to reduce the transmission from pets to humans, especially to infants and young children (Stull *et al*., 2015).

Transmission of antibiotic resistant *Campylobacter* infections

Antimicrobial resistance (AMR) is a rising public health threat in many developing nations (WHO, 2015). Antimicrobial use in animals results in the emergence and spread of resistant bacteria to in contact humans (Ayukekbong *et al*., 2017). For *Campylobacter* infections, antibiotic therapy with enrofloxacin and the macrolides (erythromycin and azithromycin) should be used prudently in animals will self-resolve with supportive therapy (Marks, 2003). However, the widespread use of antimicrobials in the treatment of *Campylobacter* infections has resulted in the emergence and dissemination of multidrug- resistant (MDR) bacterial pathogens (Fitzgerald, 2008). The highest levels of resistance in pet animals have been reported for ciprofloxacin, nalidixic acid and tetracyclines (EFSA 2015).

Resistant *Campylobacter* infections in pet animals may pose a risk to highly susceptible owners (Guardabassi *et al*., 2004). In the United States, a multistate outbreak of multidrug-resistant *Campylobacter* infections was reported in humans linked to contact with pet store puppies (CDC, 2018). Damborg *et al*.

(2004) have reported direct transmission of quinolone-resistant *Campylobacter* from dogs and cats to humans. Antimicrobial-resistant bacteria can be spread through direct contact (petting, licking, etc.) or indirectly, via the household environment, contamination of food, etc. (Guardabassi *et al*., 2004).

One Health approach in control of zoonotic campylobacteriosis

"One Health" refers to the collaboration of veterinary and human medicine with clinicians, researchers, agencies and governments working together for the benefit of domestic and wild animal and human health and the global environment (AVMA, 2008). Initially, "One Health" research focused on zoonoses from wild animals and farm animals, however, small companion animals, in particular dogs and cats, play a significant role in the transmission of important zoonotic infectious diseases such as campylobacteriosis (Day, 2011).

Veterinarians play a key role in protecting pets and their owners. It is the duty of veterinarians and physicians to provide information to pet owners about pet-associated diseases especially campylobacteriosis; they need to be aware of the immune status of their clients and of the presence of high-risk household members (infants and young children) in order to provide targeted education and recommendations (Iannino *et al*., 2017). Physicians, veterinarians, pet owners, breeders, laboratory technicians and public health officials should remain vigilant in cases of diarrheal illness in both humans and pet animals. The public health, medical and veterinary professions as well as the public should cooperate and collaborate to identify, control and prevent *Campylobacter* transmission between pets and humans (Campagnolo *et al*., 2017).

Conclusion

Pet ownership is considered a risk factor for human campylobacteriosis; however, pet-associated *Campylobacter* infections are a minimally investigated area in Africa. There is need to update our knowledge on the prevalence of *Campylobacter* spp. in dogs and cats and their role as possible sources of human campylobacteriosis. There is a need for greater public health awareness surrounding the zoonotic nature of *Campylobacter* infections and the susceptibility of pets and their owners to this infection. There needs to be collaboration between medical, public health and veterinary professionals as encouraged by the "One Health" approach, to identify, control and prevent *Campylobacter* transmission between pets and humans.

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