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Toxocara canis: why should we take an interest?

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ABSTRACT: This article aims to review *Toxocara canis* and the effects of this zoonotic parasite on people in the UK in the form of toxocariasis. This is achieved by reviewing the prevalence of *T.canis* and then toxocariasis. Preventative options are identified as using anthelmintics, clearing faeces and basic hygiene. These preventative measures are only achievable with effective education of pet owners by veterinary professionals including veterinary nurses. As a result, veterinary nurses can have a key role in the One Health approach whereby they can help protect the health of animals and people through education.

Keywords: *Toxocara canis*; toxocariasis; egg count; anthelmintic

Introduction

Since working in veterinary practice, the close relationship owners have with their pets has always interested the author; although there are many benefits to this, such as companionship, there are also risks through zoonotic infections. *Toxocara canis* (which can cause toxocariasis in people) can be easily treated in animals, so with appropriate education and advice it should be of limited risk to people.

Prevalence in dogs

The prevalence of *T.canis* in dogs varies between literature. Wright (2017) suggests that it is ubiquitous so exposure to it is almost inevitable. Fisher and McGarry (2006) suggest that all pregnant bitches and untreated puppies should be assumed to be infected.

Although the majority of infections occur in puppies, patent infections can also occur in adult dogs for a variety of reasons; including if they have reduced immunity or are pregnant. Approximately 5% of the adult dog population is thought to be infected with *T.canis* at any time although infections in adult dogs are usually asymptomatic. Therefore, they could be contaminating the environment with *T.canis* eggs without the owner's knowledge (Fisher & Elsheikha, 2010).

Prevalence in people

The exact figures for toxocariasis in people in the UK varies between literature and is effectively impossible to calculate, as most cases are asymptomatic, and it is also not a notifiable disease (Public Health England, 2018). One statistic claims there is one confirmed case per 14 million people in the UK (The Kennel Club, 2015) whereas the UK government published that there were 5 confirmed cases in 2017 for the whole of the UK (Public Health England, 2018).

People are paratenic hosts for *T.canis*, so if people ingest an infective egg, somatic migration can occur whereby the larvae are released from the eggs. The larvae do not develop beyond this stage in humans so this cannot be passed between humans. It will be asymptomatic in the majority of cases but does have the ability to cause serious health problems depending on where the larvae come to rest (Bayer Animal Health, 2006).

Toxocariasis is most common in young children as they are more likely to ingest soil which could be contaminated with *T.canis* eggs. Contaminated soil is seen to be the most widely recognised source of human infection (Rubinsky-Elefant, Hirata, Yamamoto & Ferreira, 2010).

There are a number of different forms of human toxocariasis:

Visceral larva migrans occur when the larvae settle in visceral tissues such as the lungs and/or liver and can cause fever, respiratory problems, anemia and a reduced appetite (Rubinsky-Elefant, Hirata, Yamamoto & Ferreira, 2010).

Ocular larva migrans occur when the larvae settle in either the eye or optic nerve. This has the ability to cause visual impairment or even blindness (Smith et al., 2009).

Covert toxocariasis occurs when a patient has mild symptoms associated with toxocariasis, including increased antibodies to it and symptoms such as coughing, abdominal pain and headaches (Smith et al., 2009).

Neural larva migrans occur when larvae have migrated to the brain and can cause symptoms such as seizures and headaches (Lee, Schantz, Kazacos, Montgomery, & Bowman, 2010).

A recent review showed children with a toxocariasis infection (remember many could be asymptomatic) could be at a higher risk of developing asthma than those not affected by toxocariasis and that more research is suggested for this area (Aghaei et al., 2018).

Prevention

To prevent the risks, it is paramount the number of eggs that enter the environment are reduced to help protect human and animal health.

It is essential to choose an effective anthelmintic to treat and/or prevent patent infections of *T.canis* in dogs, as worming offers the most effective way of preventing worm burdens and in turn reduces environmental contamination of eggs (Schantz, 2006). There are numerous anthelmintics available in the UK and most veterinary practices will have a worming protocol.

A number of animal health organisations provide recommendations for dog worming. The British Small Animal Veterinary Association (BSAVA) advise that every dog is different in the frequency and type of anthelmintic needed and the likelihood and importance of reinfection should be analysed before making a recommendation to clients including whether there are children in the house (Fisher, 2006). The BSAVA recommends worming all puppies from the age of two weeks and following manufacturer's guidelines until 12 weeks of age to prevent the shedding of *T.canis* eggs as they are likely to have the highest burdens. Following this, treatment should be on a case by case basis.

The European Scientific Counsel of Companion Animal Parasites (ESCCAP, 2017) gives similar guidelines to the above. However, they also recommend monthly worming until the age of six months after the initial 12 week period and also worming the dam at the same time as the puppies. They highlight the fact that *T.canis* rarely causes clinical signs in adult dogs, so unless regular faecal examinations are made, regular anthelmintic treatments at least four times a year are recommended throughout a dog's life to prevent environmental contamination. As an alternative they would also suggest regular faecal examinations and to treat according to the results. They also highlight a lack of research into retreatment intervals for anthelmintics which could hinder appropriate suggestions to clients. These guidelines also emphasise the need to educate the public about zoonoses associated with some worms and their prevention and identifies veterinary professionals to be key in achieving this.

Removing faeces from the environment is also vital and people with dogs in the UK have a legal duty to do this or risk being fined (Keep Britain Tidy, n.d.). *T.canis* eggs take 10-21 days to become infectious once in the environment so there is little risk from fresh faeces with basic personal hygiene. However, when they are released into the environment they can survive for several months (NHS, 2018).

T.canis can also be carried by wildlife such as foxes and *Toxocara cati* which can be carried by cats, can also cause toxocariasis in people. Thus, the removal of eggs from the environment can only go so far. It is therefore also important for everyone to be able to adopt good basic hygiene especially washing hands when they have been in contact with soil to help avoid ingestion of any eggs.

Education

Wells (2007) compiled a survey to assess the extent of the public's understanding of toxocariasis in the UK by interviewing 1023 members of the public from across the UK. Only 529 people were aware that dog faeces could be harmful to human health whilst only 44 people had heard of toxocariasis. Knowledge of symptoms of the disease in humans was also very poor and only 16 people were aware preventative such as regular deworming, anti-fouling schemes and personal hygiene should be used as preventative measures. Worryingly, pet owners were no more likely to have knowledge on the prevention measures of the disease than non-pet owners, as Wells (2007) highlights,

pet owners have an essential role to play in the control of the zoonoses. Wells (2007) acknowledged that the sample size was relatively small compared to the UK population, so the results may not be accurate, and therefore recommended a more comprehensive study especially of pet owners.

It is clear that more effective education is needed into the prevention of toxocariasis. However, it is important to select the most appropriate method of education in order to maximise impact.

This was highlighted by a government educational campaign that took place in the Netherlands in 1993 following a survey (Overgaaauw, 1996) similar to that in the UK however, in this case vets and doctors were also surveyed. The initial survey showed that like in the UK knowledge on *Toxocara spp.* and toxocariasis was inadequate or generally absent. Information on *Toxocara spp.* and toxocariasis was sent to all vets and doctors in the country and publications were made in medical journals and popular magazines. Brochures were sent to the vets and doctors to be distributed to patients and clients on the subject. There were also radio and television programmes on the subject. Following the campaign, a random sample of the population were questioned again to see if their knowledge had improved. However, this showed that only the knowledge of vets had improved on some topics. The knowledge of doctors and the public had not changed, with only 8.2% of the public questioned knowing that the campaign had taken place (Overgaaauw, 1996). This was clearly a very time consuming and expensive campaign, but it had minimal impact, highlighting the need to select educational methods carefully.

Maris (2008) shows that when educating clients, handouts can be vital to reinforcing verbal advice given and ensuring that everyone in a practice is providing the same and consistent advice so as not to confuse clients. These handouts can also increase client compliance with advice given and help demonstrate professionalism.

Veterinary professionals including veterinary nurses (VNs) are key members of society who are able to acquire the requisite knowledge and means to discuss *T.canis*, its problems and its control methods, with dog owners, as well as keeping current figures of toxocariasis in humans to a minimum. It is vital that they have the knowledge and ability to carry out this role for society at large and this needs to be backed by continuing and further research into the subject.

To date there has been no research into the role of the VN in the control of worms however, a number of authors have given their opinion on how they feel VNs can aid the education of dog owners on the subject.

Kennedy (2010) suggests running puppy clinics as these provide a good opportunity to speak to clients about parasites, as well as encouraging clients to follow good practice from an early age. This could also be advantageous as puppies are most at risk of patent *T.canis* infections. The same author also suggests having a designated parasite nurse, who could run parasite clinics and also give advice generally when required.

Logan (2008) highlights that VNs could utilise their skills in performing faecal egg counts on a regular basis, to assess the need for worming. This is common practise in the United States. Being able to show clients evidence of eggs could encourage them to be more responsible in clearing up faeces and prompt them to worm their dogs regularly.

Conclusion

Although the number of confirmed serious cases of toxocariasis in the UK are low, with the high prevalence in dogs, it is essential to assist in educating the public and especially dog owners in reducing egg contamination of the environment and therefore reducing the risk of people ingesting eggs.

This has been identified as:

Using effective anthelmintics in dogs.

Basic hygiene (such as washing hands).

Removing faeces from the environment as quickly as possible.

VNs in practice are in a prime position to use their skills and knowledge to help educate clients about *T.canis*, especially if the clients have young children. This could include during puppy classes or simply providing appropriate handouts. This can not only help to highlight their valuable role to owners, but also on a larger scale ensure veterinary professionals are adopting a One Health approach, whereby they are protecting both human and animal health.

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Multiple Choice Questions

1. Most Toxocariasis cases in humans result in:

- (a) Blindness
- (b) Headaches
- (c) No symptoms
- (d) Asthma

2. People are what type of hosts for *T.canis*?

- (a) Paratenic
- (b) Primary

- (c) Secondary
- (d) Reservoir

3. People can reduce the risk of ingesting *T.canis* eggs by:

- (a) Using effective anthelmintic in dogs
- (b) Washing hands regularly
- (c) Removing faeces from the environment as quickly as possible
- (d) All of the above

4. *T.canis* eggs in faeces are infectious:

- (a) Immediately
- (b) After 10-21 days
- (c) After 1-2 weeks
- (d) After several months

For the answers to the MCQs, please go to: <http://www.bvna.org.uk/publications/veterinary-nursing-journal>