Searching the Literature for Risk Factors of Parasite Transmission in Dog Parks with a focus on Appalachia

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Abstract

Dog parks are designated public spaces where dogs can move freely under their owners' supervision and allow animals to exercise and socialize. Despite the benefits dog parks provide to dogs and their companions, the confined spaces where they interact with other dogs could contribute to risk for dogs acquiring parasitic infections. In these environments, dogs may be exposed to potential sources of infection from abandoned poop piles, contaminated soil and water, and other dogs. Parasitic infections can be harmful to dogs by disrupting the gut microbiome, which contributes to metabolic functions, protects against pathogens, and maintains important physiologic functions.

We began searching the literature for factors associated with risks of dogs acquiring or transmitting a parasitic infection at the dog park. Currently, we are reviewing factors of the behaviors of dog owners and their dogs, geographic trends, and features of the physical and social environment, in which dog parks are set. By first identifying the factors associated with the risk of parasite transmission at dog parks, we can begin to test and eventually guide pet owners to make responsible decisions and inform park and wildlife managers for improved safety measures.

Introduction

A local dog park can encourage physical activity, through dog walking and play, which contributes to human and canine physical wellness. Additionally, socializing in a controlled environment such as a dog park allows dogs to build and maintain relationships with other dogs, their owners, and the neighborhood, thereby strengthening community connectedness.

While there are many benefits to bringing dogs to dog parks, it should be done with caution as park use may pose risks for parasite infection in dogs. To explore the perceived risk of exposure to parasitic and zoonotic agents at dog parks, a literature search was conducted to explore possible risk factors. We focused on articles pertaining to the Appalachian region. Using a One Health approach, we considered the health of humans, animals and the environment in our literature search for potential risk factors for parasite transmission in dog parks. This included: cohabitation with other animals, dog walking patterns, ability to obtain veterinary care, park maintenance, and the presence of parasites in the soil, vegetation, and water.

Methods

Online databases including Google Scholar and PubMed were searched through for articles containing information related to the existing knowledge on parasitic infections in dogs and the design strategies of dog parks. These databases were accessed between August 2022 and April 2022. Performing the search using terms such as "parasitic infection" "dogs" "Appalachia" "parasitic transmission" and "dog parks", we found a total of 41 articles with relevant information of studies conducted both nationally and internationally.

Trends in the Literature

Appalachia consists of 13 states from southern New York to northern Mississippi (11). Rural areas of this region have historically been economically distressed and **medically underserved**.

There are also areas with **inequitable access to animal care** (12). Lack of accessible care, cost of veterinary care, lack of veterinary client communication, and lack of client education negatively affects overall dog health and wellness.

Lack of anthelmintic treatments, regular visits ensuring proper vaccination, and provision of health and hygiene messaging contributes to poor dog health, which is especially problematic in **confined areas like dog parks** and can contribute to an increased risk of parasitic transmission.

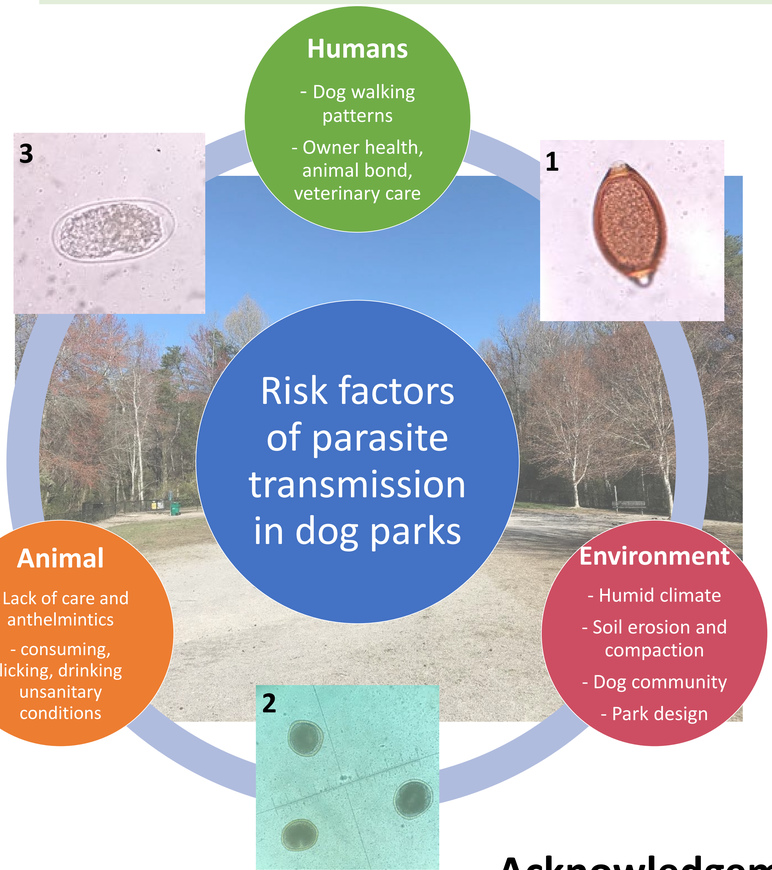
Additionally, **limited park and community resources** may lead to dog parks lacking extensive worm control programs as well as technology to monitor public engagement and proper use of park equipment including disposal of feces, and supervision.

Figure: (**Above**) Tommy Schumpert dog park in Knoxville, TN. Hydology, vegetation, and soil chemistry are predicted to influence the presence and persistence of infectious microbes and parasites. (**Right**) Parasites identified from abandoned poop piles collected in East TN dog parks, from top right clockwise: (1) *Trichuris vulpis*, (2) *Toxicara canis*, and (3) *Ancylostoma* sp.

Parks allow for a broad range of **dog walking behaviors** including off-leash, on-leash, and mixed. Greater off-leash activity, number of parks visited, and frequency of park use was positively associated with increased risk of parasitism in dogs (2).

High levels of human and canine movement increase opportunities for exposure to parasites. Off-leash dogs **roaming around dog parks freely** may be more likely to investigate contaminated bodies of water, abandoned poop piles, alternative food sources and interact with other dogs as opposed to leashed (10).

Also contributing to the risk of parasitic transmission is **the total number and species of animals in the home**. Of the top 10 states with the highest percentage of pet ownership, 3 states of the Appalachian region were included: West Virginia, Mississippi, and Kentucky.



On average, Appalachia has a **humid continental climate** with 4 distinct seasons with 40-60 inches of precipitation annually.

Due to **variation in the elevation** due to mountain ranges, microclimates are common across Appalachia. **Climatic zones, average rainfall, and maximum temperatures** are associated with contamination of parks with parasites such as hookworms (15). Soil erosion and damage to vegetation can contribute to parasitic transmission.

Stray dogs and wild animals may contaminate the environment with parasites and infective eggs or larvae may persist in the soil at dog parks.

Dual-purpose parks which contain **shared sites for humans and animals** may include sandpits, sandboxes, gardens, playgrounds which house parasitic eggs and can contribute to transmission (16).

Next Steps

The Kolp lab at LMU is currently **surveying dog parks in East TN for parasite contamination**, visiting parks monthly to collect abandoned poop piles and surrounding soil to detect seasonal trends. We will collect **fresh fecal samples from dogs and interview owners** for animal health, demographic, diet, medical history and lifestyle.

Future work will involve processing fecal and soil samples for microbiome data to **test for the presence of pathogenic microbes**. We also plan **to characterize physical environment of dog parks** relating to topography, vegetation, and hydrology..

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