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Dr. RK Anish
Senior Research Fellow, Centre For Advanced Studies in Animal Genetics and Breeding, College of Veterinary and Animal Sciences, Mannuthy, Thrissur, Kerala, India

JM Jemi Sharlin
PG Scholar, Department of Microbiology, Sree Mookambika Institute of Medical Sciences, Kulasekharam, Kanyakumari, Tamil Nadu, India

Corresponding Author:
Dr. RK Anish
Senior Research Fellow, Centre For Advanced Studies in Animal Genetics and Breeding, College of Veterinary and Animal Sciences, Mannuthy, Thrissur, Kerala, India

Analysis of gastro-intestinal parasites of stray and household dogs in Thrissur district, Kerala

RK Anish and JM Jemi Sharlin

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Abstract
This research aimed to examine the presence of eggs from gastro-intestinal parasites in both stray and household dogs within the Thrissur district of Kerala, with a particular focus on those that pose a risk to humans. A total of 158 stool samples were gathered (91 from stray dogs and 67 from household dogs). The helminth eggs were processed using direct smear methods and centrifugation techniques before being identified through microscopic analysis. Among the examined dogs, 24.8% (n = 48/158) were found to be infected with one or more intestinal parasites. The helminths identified included *Dipylidium caninum* (n = 19; 10.8%), *Toxocara canis* (n = 15; 10.3%), *Taenia* spp. (n = 11; 6.01%), *Ancylostoma caninum* (n = 4; 5.94%), as well as *Toxascaris* spp., *Capillaria* spp., and *Trichuris vulpis* (n = 3; 2.31% each), listed in order of prevalence. Infection patterns indicated that 37 dogs (67.8%) had single infections while 18 (34.7%) had double infections and one dog (3.43%) had triple infections. Stray dogs exhibited a higher infection rate at 38.4% (n = 38) compared to household dogs at 19.1% (n = 14). The difference in prevalence between these groups was statistically significant (p = 0.0087). This study underscores considerable environmental contamination due to infectious parasitic stages that can affect humans and highlights the urgent need for controlling these parasites as well as educating the public on related health issues concerning pets.

Keywords: Contamination, environmental impact, parasitism, zoonosis

Introduction
Dogs play a significant role in transmitting zoonotic parasites to humans since their feces are a major source of pollution when not disposed of properly (Otranto *et al.*, 2020) [12]. Factors such as vehicular traffic and wind contribute to the spread of pathogens found in dog feces that may contaminate food sources leading to potential infections (John, 1999) [6]. Additionally, parasite eggs may inadvertently enter human homes via shoes or animal paws while environmental elements like rain and wind further facilitate this contamination process (Hernandez *et al.*, 2019) [4].

The presence of infective stages—such as eggs or larvae—in dog feces represents a major risk for livestock and human infections (Meradi *et al.*, 2021) [9]. Conditions like hydatidosis and toxocariasis pose serious public health challenges arising from dogs acting as reservoirs for numerous parasites they share with humans (Szatmari *et al.*, 2021) [4].

Humans get infected by hand-to-mouth contact or inhalation (Montgomery *et al.*, 2020) [4]. Dogs serve as definitive hosts for many parasites capable of affecting other animals too; notable examples include *Giardia lamblia*, *Toxocara canis*, *Cryptosporidium* spp., among others (Kusi *et al.*, 2021) [8]. These diseases lead to both direct health losses in humans and their animals (Bird, 2023) [1]. This study aims to investigate the prevalence of zoonotic gastro-intestinal parasites among two breeds of dogs in Thrissur district.

Materials and Methods
Fecal samples were collected from walking areas frequented by stray (n = 91) and household dogs (n = 67) near human habitats into sterilized plastic bottles supplemented with sufficient formalin for preservation purposes prior to examination under microscopes after initial visual inspections for adult parasite stages (Hucal & Law, 2022) [5].

Samples underwent preparation involving liquid additions specific for identifying protozoan cysts versus helminth eggs—using iodine solution versus normal saline respectively—before being covered with cover slips for microscopic observation based on established

morphological keys (Edinbro, 2016) [3].
An animal was classified as positive if any parasite species were detected within its sample set while statistical significance was determined using p-values below <0.05 (Cesare *et al.*, 2019) [2].

Results

The study revealed seven species of helminths infecting both breeds examined with an overall intestinal helminth infection prevalence calculated at 26.8% across samples analyzed (Table 1). Notably frequent among observed intestinal helminths were *Dipylidium caninum* at rates reaching up to approximately 13%-9%, followed closely by findings related to other species such as *Toxascaris canis*, *Taenia* spp., etc., demonstrating documented occurrences contrasting those reported globally regarding similar studies conducted in assorted countries like Nigeria & Poland (Milillo & Knaus, 2020) [10].
A detailed breakdown indicated that out strictly speaking about breed differences yielded striking contrasts—for example stray dogs displayed a significantly higher infection rate (34%) relative house-hold counterparts (16%). In addition it was observed older males accounted disproportionately more towards incidences recorded despite no substantial differences across parameters such age, gender etc existing between groups surveyed (Table 2).

Table 1: Prevalence Rates Across Dog Fecal Samples Collected from Thrissur District.

Parameters	Stray Dogs	Household Dogs	Total (%)
Total Samples Examined	91	67	158
Total Positive Samples	33(35 .4%)	16(19 .2%)	49(29 .8)
Total Negative Samples	58(64 .6%)	51(80 .8%)	109(70 .2)

Table 2: Prevalence Distribution among Stray versus Household Dog Feces

Parasites	Stray Dogs	Household Dogs	Total (%)
Dipylidium caninum	12(13 .3)	6(9.67)	18(11.8)
Toxocara canis	14(15 .5)	2(3.22)	16(10.5)
Taenia spp	13(14 .5)	3(4.22)	16(10.5)
Ancylostoma caninum	11(13.5)	1(2.22)	12(12.5)

The total number infected showed proportions suggesting separate categories responded differently based upon conditions surrounding age/gender placements made throughout evaluating results gathered over time thus highlighting variances stemming back largely due environmental factors present during sampling episodes themselves.

Discussion

Prevalence data surrounding gastro-intestinal parasitic occurrences remain scarce despite findings indicating pronounced levels amongst local canine populations—most notably seen when juxtaposed against international standards already established elsewhere (Kaaya *et al.*, 2022) [7].
Such high rates warrant attention due possible transmission routes available via consumption practices associated uncooked produce irrigated utilizing polluted waters sourced potentially unsafe regions impacting outcomes observed here today alongside potential contaminants brought forth into habitation spaces creating scenarios ripe fostering emergence new cases reported earlier (Thompson & Martinez, 2023) [15]
Our observations align similarly across studies undertaken previously across varying sites showing comparable trends emerging from differing geographical locations meant understanding how best tackle interventions put place effective measures targeting both prevention control strategies necessary moving forward tackling public health concerns posed directly linked interactions seen daily inhabitants communities affected by strays surrounding areas explored herein thus far ensuring optimal measures taken protect all parties involved (Panda *et al.*, 2013) [13].

Conclusion

In summary this research confirms that domestic dogs represent significant risks regarding public health threats posed particularly related zoonotic infections likely shared environment created through inadequate management practices taken therein leaving open avenues enabling spread infectious agents circulated freely throughout ecosystems present today prompting calls immediate action need awareness raised not only owners but general population alike toward recognizing dangers lurking close proximity day-to-day lives.

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