



# Enteric Parasitic Infections in Canaanite Dogs in Aqaba: Identifying Priority Prevention and Control Areas

Montasir Al-Mansi<sup>1</sup>, Musa T. Ajlouni<sup>2</sup>

<sup>1</sup>Jordan Food and Drug Administration (JFDA), Jordan, Montasir.Mansi@jfda.jo

<sup>2</sup>Public Health Specialist, Jordan, ajluni1@gmail.com

Received Date : May 25, 2022 Accepted Date : June 28, 2022 Published Date : July 07, 2022

## ABSTRACT

Stray dogs are considered a storehouse for parasitic infections and a source of transmission of these parasites. Since these dogs were collected in Aqaba/Jordan through the Al-Rabee Society for the Protection of Environment and Animals. These dogs not given any anti-parasitic drugs. So this study aimed to determine parasitic infections in stray dogs (They are all of the Canaanite dog breeds) to protect the shelter workers and visitors from the risk of infection through direct contact with them. As well as training the students of the Faculty of Science, Department of Biology, on the types of these parasites. We collected 145 dog stool samples from the shelter. Then analyzed them in the laboratory of the University of Jordan/ Aqaba branch. We found that the incidence of intestinal parasites was 66%, the percentage of infected adult dogs was 69%, while the percentage of infected puppies was 60%. Approximately 8% of the infected dogs hosted more than one parasite species. The most parasites found were *Ancylostoma caninum*, *Toxocara canis*, *Dipylidium caninum*, and *Trichuris vulpi*. Based on these results, we recommend periodically providing appropriate treatment for all shelter dogs, using all personal protection methods from washing, continuous sterilization, and not eating in the shelter.

**Key words:** Parasites, Shelter, Stray dogs.

## 1. INTRODUCTION

Humans most commonly become infected with zoonotic parasites by consuming infected food or water or via direct fecal-oral contamination. Among gastrointestinal parasites, dogs are hosts for several species, including wide spread parasites that affect humans, such as *Ancylostoma caninum* (cutaneous larva migrans and eosinophilic enteritis) and *Toxocara canis*, which is a major health problem due to visceral migration and damage that may affect important organs, such as the eyes, liver and brain [1] as a result of absence of public education about the risk of zoonotic diseases transmitted from dogs, and the non-existence of a control strategy for stray dogs [2]. However, dogs close contact with humans remains a major threat to public health, as dogs are main reservoirs of many infective stages of parasites that can be transmitted to human and other domestic animals [3], [6].

Dogs act as definitive or reservoir hosts for more than 60 zoonotic parasites, such as *Toxocara canis*, *Echinococcus spp.*, *Taenia spp.*, *Dipylidium caninum*, *Ancylostoma spp.*, *Giardia spp.*, as well as *Cryptosporidium spp.* It was estimated that one-third of the dogs infested with parasites; therefore, it is important to determine their types to educate the local community about this parasitic infection, as well as to educate the workers in the stray dog's shelters [3,4].

Many dogs feel discomfort caused by fleas, ticks, or roundworms. While fleas and ticks can sometimes be easy to spot and identify, s for internal parasites are different as they can be present in a dog without being recognized. These parasites can be extremely irritating to dogs and can cause severe health problems [3].

In dogs, intestinal parasite infections are usually subclinical but can become clinically apparent in puppies and adults with considerable burdens.

Stray and shelter dogs maintain more rapid rates of patent infections than dogs in the general population. Understanding the risk of canine intestinal parasite infection is important to recognize the need for effective testing and control measures.

In regions of developing countries with tropical, subtropical, and equatorial climates, four genera of parasites between metazoan and protozoan stand out as extremely prevalent in dog infection: *Toxocara spp.*, *Ancylostoma spp.*, *Trichuris spp.*, and *Giardia spp.* [5], [6].

This study aims to determine the prevalence of the main enteric parasites infecting stray dogs in Aqaba, Jordan.

Aqaba is a very hot city, so it considered a suitable climate for the growth and development of many types of parasites in dogs, especially dogs that live in one gathering, such as a shelter [7]. Therefore, it is necessary to collect enough number of dog feces samples in the shelter and analyze them to search for eggs or parasite stages to identify the types of parasites in those dogs. There are no previous studies on intestinal parasites that affect shelter dogs Aqaba or Jordan.

## 2. METHODOLOGY

### 2.1 study area

The study was conducted in Aqaba city located south of Jordan. Aqaba is the only coastal city in Jordan and the largest and most populous city on the Gulf of Aqaba. Aqaba had a population of 208,000 in 2021 and a land area of 375 square kilometers. Today, Aqaba plays a major role in developing of

**Table 1.** Results of eye examinations for the dogs' stool general condition

Dog age	No. of stool samples	Abnormal color	Presence of mucus	Presence of blood	Abnormal texture	Presence of vegetable cells	Presence of hair	Presence of undigested food	Presence of parasites
Adult	95	34	48	3	22	0	63	70	79
Puppy	50	16	24	0	19	6	36	32	30

**Table 2.** Type and percentage of parasitic infestation

parasitic infestation	Ancylostoma caninum	Ancylostoma braziliense	cestodes	Diplidium caninum	Toxocara canis	Trichuris vulpis	Null
No.	36	1	2	20	32	18	36
%	25	0.7	1.3	14	22	12	25

the Jordanian economy, through the vibrant trade and tourism sectors. Aqaba's strategic location at the northeastern tip of the Red Sea between the continents of Asia and Africa, has made its port important throughout thousands of years

## 2.2 study population

This study was conducted in Aqaba dog's shelter that hosts most of the stray dogs in Aqaba (about 500 dogs) [8].

## 2.3 Samples collection

One hundred and forty-five dog's fecal samples (Ninety-five for adult dogs and fifty for puppies) were collected in the morning of Saturday, May 31, 2021, from the shelter. A random sample collection technique was used to collect these samples using gloves, tongs, cups, preservation boxes for collection. All samples were collected by trained students from the University of Jordan- Aqaba branch.

The samples were transferred to the laboratory of the University of Jordan, Aqaba branch, on the same day and within two hours of collecting the samples [9].

The collected samples were analyzed by the students under direct supervision academic supervisor responsible for them using a light microscope. The samples were also examined with the naked eye to assess the stool's condition and see if there were parasitic worms [10].

## 2.4 parasitological analysis

Slides were analyzed by light microscopy with 40x and 100x objectives lens. To be diagnosed with parasitosis, the animal must have been positive in at least one of the tests [11].

## Ethical clearance

This study was approved by the Ethics Committee for the Use of Animals under protocol no 023/2015, under protocol CAAE

51181915.6.0000.5526, from the State University of Santa Cruz, Bahia. Permission was obtained from Al-Rabee Association to protect the environment and animals, which is responsible for the shelter, to carry out collection work [1].

## 3. RESULTS AND DISCUSSION

As shown in Table 1, the naked eye stool examinations revealed that ninety-five samples were normal, seventeen were green, and thirty-three were yellow.

Seventy-two samples were observed with a mucous consistency, blood was observed in three samples, ninety-four samples were of solid consistency, forty-one samples were of a watery consistency and the rest were of normal consistency. Vegetable cells were observed in six stool samples, hair was observed in ninety-nine samples, and the presence of undigested food was seen in one hundred and two stool samples.

Regarding parasitic infection in stool samples as indicated in Table 2, the following was found: Thirty-six specimens contained *Ancylostoma caninum*, one sample contained *Ancylostoma braziliense*, two samples contained cestodes, twenty samples contained *Diplidium caninum*, thirty-two samples contained *Toxocara canis*, eighteen samples contained *Trichuris vulpis*, and Forty-eight samples were free of all parasite stages.

The results of this study confirm the results of other studies that in dogs, intestinal parasite infections are usually subclinical but can become clinically apparent in puppies and adults with considerable burdens. Stray and shelter dogs maintain more rapid rates of patent infections than dogs in the general population .

## 4. CONCLUSION AND RECOMMENDATIONS

Based on the results of this study, we recommend providing periodical and appropriate treatment for all dogs in the shelter. Especially treating parasitic diseases even if those dogs do not have clear clinical symptoms, dealing with dog feces in the shelter quickly and hygienically. Use all personal protection methods as washing, sterilizing, and avoiding eating food in the shelter by workers or visitors.

In addition, Aqaba health authority should adopt a public education campaign about the risk of zoonotic diseases transmitted from dogs and the develop a strategy for controlling stray dogs in Aqaba.

#### ACKNOWLEDGMENT

The Authors thank Dr. Mohammad wahsha and the students of the University of Jordan, Aqaba branch, and Al-Rabee Society for the Protection of the Environment and Animals for their support and efforts in bringing this work to its final form.

#### REFERENCES

1. Fabian Schär, Tawin Inpankaew, Rebecca J Traub, Virak Khieu, Anders Dalsgaard, Wissanuwat Chimnoi, Chamnan Chhoun, Daream Sok, Hanspeter Marti, Sinuon Muth and Peter Odermatt. **The prevalence and diversity of intestinal parasitic infections in humans and domestic animals in a rural Cambodian village.** *Parasitology International*, Volume 63, Issue 4, Aug. 2014.
2. R Nijse, L Mughini-Gras, J A Wagenaar and H W Ploeger. **Coproscopy in dogs interferes in the diagnosis of parasitic infections by faecal examination,** *Veterinary Parasitology*, Volume 204, Issues 3–4, 29, Aug. 2014.
3. Federica Gerardi, Antonio Santaniello, Luisa Del Prete, Maria Paola Maurelli, Lucia Francesca Menna and Laura Rinaldi. **Parasitic infections in dogs involved in animal-assisted interventions.** *Italian Journal of Animal Science*. Jul. 2017.
4. Tatiani Vitor Harvey, Alice M. Tang, Anaiá da Paixao Sevá, Camila Albano dos Santos, Silvia Maria Santos Carvalho, Christiane Maria Barcellos Magalhães da Rocha, Bruno César Miranda Oliveira and George Rego Albuquerque. **Enteric parasitic infections in children and dogs in resource-poor communities in northeastern Brazil: Identifying priority prevention and control areas.** *PLOS Neglected Tropical Diseases*, 0008378, Jun. 2020.
5. Kristina Stafford, Todd M Kollasch, Kathryn T Duncan, Stephanie Horr, Troy Goddu, Christine Heinz-Loomer, Anthony J Rumschlag, William G Ryan, Sarah Sweet and Susan E Little. **Detection of gastrointestinal parasitism at recreational canine sites in the USA: the DOGPARCS study.** *Parasites Vectors*, 13:275, Jun. 2020.
6. Maysa A. I. Awadallah and Lobna M. A. Salem. **Zoonotic enteric parasites transmitted from dogs in Egypt with special concern to *Toxocara canis* infection.** *Veterinary World*, EISSN: 2231-0916, Aug. 2015.
7. Filipe Dantas-Torres, Jennifer Ketzis, Andrei D. Mihalca, Gad Baneth, Domenico Otranto, Gabriela Perez Tor, Malaika, Watanabe, Bui Khanh Linh, Tawin Inpankaew, Pablo, D. Jimenez Castro, Pablo Borrás, Sangaran Arumugam, Barend L. Penzhorn, Adrian Patalinghug Ybañez, Peter Irwin and Rebecca J. Traub. **TroCCAP recommendations for the diagnosis, prevention and treatment of parasitic infections in dogs and cats in the tropics.** *Veterinary Parasitology*, Volume 283, July 2020.
8. Enrique Trasviña-Muñoz, Gilberto López-Valencia, Pedro Álvarez Centeno, Sergio A. Cueto-González, Francisco J. Monge-Navarro, Luis Tinoco-Gracia, Karla Núñez-Castro, Paulina Pérez-Ortiz, Gerardo E. Medina-Basulto, Alma R. Tamayo-Sosa, Daniel Gómez-Gómez. **Prevalence and distribution of intestinal parasites in stray dogs in the northwest area of Mexico.** *Austral journal of veterinary sciences*, On-line ISSN 0719-8132. May 2017.
9. Fabian Schärab, TawinInpan kaewcd, Rebecca J.Traube, Virak Khieuabf, Anders Dalsgaardc, Wissanuwat Chimnoid, Chamnan Chhoung, Daream Sokg, Hanspeter Martibh, Sinuon Muthf and Peter Odermatt. **The prevalence and diversity of intestinal parasitic infections in humans and domestic animals in a rural Cambodian village,** *Parasitology International*, Volume 63, Issue 4, Aug. 2014.
10. Cosme Alvarado Esquivela, Dora Romero Salasb, Mariel Aguilar Domínguezb, Anabel Cruz Romerob, Nelly Ibarra Priegob, and Adalberto Ángel Pérez de León. **Epidemiological assessment of intestinal parasitic infections in dogs at animal shelter in Veracruz, Mexico,** *Asian Pacific Journal of Tropical Biomedicine*, Volume 5, Issue 1, Jan. 2015.
11. L. A. Trotz-William and A. J. Trees. **Systematic review of the distribution of the major vector-borne parasitic infections in dogs and cats in Europe.** *VetRecord*, Volume152, Issue4, Jan. 2003