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Intestinal Helminth Parasites of Stray Dogs in Kuwait

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ABSTRACT. Two hundred and eight stray dogs caught in different localities in the State of Kuwait were examined for intestinal helminth parasites between December 1979 and August 1980. Six species of helminths were recovered: *Ancylostoma caninum*, *Dipylidium caninum*, *Echinococcus granulosus*, *Heterophyes heterophyes*, *Taenia hydatigena* and *Toxascaris leonina*. Infection with *T. hydatigena* (39.42%) was the most prevalent and was followed by infections with *T. leonina* (17.31%) and *E. granulosus* (10.58%). Apart from *E. granulosus*, the other five species were recorded for the first time from Kuwait. The public health importance and possible transmission cycles for the recovered species are discussed.

Stray animals in particular cats and dogs, are known to harbour a wide variety of helminth infections and under suitable circumstances many of these infections, such as echinococcosis, filariasis, heterophyiasis, toxocariasis and trichinosis, are transmissible to man. However, species of helminth and their prevelance in stray animals vary from one community to another depending primarily on the animal population and pollution of the environment with contaminated human and animal wastes. The report by El-Gazzar and McCreadie (1962) on human cases of hydatidosis, a disease acquired by accidental ingestion of feces of dog infected with the cestode *E. granulosus* (Batsch 1786), was the first indication of the existance of helminthiasis in dogs in Kuwait. This finding was, subsequently, confirmed by the works of Hassounah and Behbehani (1976) and Hassounah (1977) on the epidemiology of *Echinococcus* infection in Kuwait. Their data revealed a high rate of infection among dogs in rural areas, coinciding with the high rate of infection among inhabitants of these areas as reported earlier by Booz (1972). Studies in neighbouring countries including Iraq (Babero *et al.* 1963), Iran (Hoghoughi and Jalayer 1967) and Jordan (Ajlouni *et al.* 1984) have also indicated the involvement

of stray dogs in the epidemiology of helminth infections of public health importance.

The purpose of this study was to determine the species of intestinal helminths and their infection rate in stray dogs in Kuwait, assess their public health significance and speculate on possible transmission cycles.

Material and Methods

From December 1979 to August 1980 two hundred and eight stray dogs from different suburbs and districts of Kuwait were examined for intestinal helminths. They were of both sexes and different ages. The dogs used in this study were killed during an eradication campaign conducted by the Veterinary Department of the Ministry of Public Works. Immediately after they were shot, dead dogs were brought to the Department of Zoology, University of Kuwait for examination.

The procedure for collecting and examining post mortem material was as follows. The abdomen was opened, the intestine was slit open by a longitudinal incision and the contents and mucosal scrapings were collected in a tray containing water. Helminths visible to the naked eye were removed and fixed as described below. Then five 10-ml aliquots of the material were removed and examined under a stereoscopic microscope (X 16). Cestodes and trematodes were fixed in 4% buffered formalin and for identification representative specimens were stained with acetocarmine and mounted in Permount. On the other hand, nematodes were fixed in 1:9 solution of glycerin and 70% ethanol and identification were made after they were cleared and mounted in lactophenol.

Results and Discussion

In the present study, 123 out of 208 dogs (59.14%) examined were found to harbour intestinal helminth parasites. Six species of helminth consisting of three cestodes, two nematodes and one trematode were recovered. *T. hydatigena* (Pallas 1766), was the most frequently encountered species of helminth in the examined dogs (39.42%). This cestode is a dog-sheep parasite, measuring up to 5 meters in length. The intermediate stage is a cysticercus, known as *Cysticercus tenuicollis* (Rudolphi 1810), occurs in liver or peritoneal cavity of herbivorous and omnivorous mammals. Dogs and occasionally man acquire infection by ingestion of the larval stage. So far, no data are available on the prevalence of *C. tenuicollis* in animals in Kuwait. The small cestode *E. granulosus* was recovered from 22 dogs (10.58%). The adults of this species is only 2 to 6 mm long, consisting of a scolex and only three to four segments. The larval stage a hydatid cyst occurs in sheep, camel, cattle and man. The commonest sites for development of the cyst are the liver and lungs, however, other organs such as bone, brain and spleen are also

susceptible to infection. It is interesting to note that previous study by Hassounah and Behbehani (1976) on *Echinococcus* infection in Kuwait showed an infection rate of 23.04% among 204 dogs examined. It is postulated that the reduction in the infection rate as indicated in this study is at least partially attributed to implementation of the preventive measures, which were recommended by the previous study. Only one dog (0.48%) was found infected with the cestode *D. caninum* (Linnaeus 1758). The adult of a common cestode of dogs and cats, of medium sized, measuring 10 to 50 cm in length. In contrast to the life cycles of *T. hydatigena* and *E. granulosus* the larval stage of *D. caninum* a cysticercoid is found in the haemocele of fleas or lice, and infection occurs by ingestion of the infected insect. *H. heterophyes* (Von Siebold 1852), was the only trematode encountered during this study. This small adult digenetic trematode, which was found in 7 dogs (3.37%), occurs also as adult in the small intestine of man and fish-eating mammals but as larva it utilizes as first intermediate hosts snails of the genera *Pirenella* and *Cerithidia* and several species of fish, particularly mullet serve as second intermediate hosts. The definitive host acquires the infection by ingestion of raw or insufficiently cooked fish harbouring the infective stage which is a metacercaria. Two species of nematode were found in the small intestine of the examined dogs. The first species is *T. leonina*, a common ascarid nematode of dogs, cats and wild carnivores in many parts of the world, was found in 36 dogs (17.31%). (The males of this nematode are 20-70 mm long and the females are 50 to 120 mm long). Dogs become infected by either ingestion of the egg containing the second-stage larva or eating rodents, roaches or earthworms harbouring the second stage larva. Man may be infected by the accidential ingestion of the embryonated eggs. The second species was *A. caninum* (Ercolani 1859), the common hookworm of dogs in most tropical areas of the world, was found in only one dog (0.48%). The adult worm, males 11 to 13 mm and females 14 to 21 mm long, is also occasionally found in man. The filariform larvae of this nematode infect dogs by mouth or skin penetration, and the occasional invasion of human skin by this larva causes a dermatitis of varing intensity, a condition known as cutaneous larva migrans.

The results presented here indicate that a large number of stray dogs (59.14%) in Kuwait were found infected with one to three species of intestinal helminths which are potentially transmissible to man. The most prevalent species of helminth recovered in this study, such as *T. hydatigena, E. granulosus, H. heterophyes* and *T. leonina* were those with larval stages evading harsh environmental conditions, such as those prevailing in Kuwait, within the tissues of their intermediate hosts or the protective shells of their eggs. Species with exposed larval stages such as, *A. caninum,* or those sheltered within small insect such as, *D. caninum*, were rarely encountered. It is important to note that 50% of the dogs examined were found infected with either *T. hydatigena* or *E. granulosus*, cestodes transmitted by infected sheep offal. This indicates that pollution of the environment with animal wastes is a major contributor to the problem. The reported infection with *H.*

heterophyes is also disseminated by improper disposal of animal wastes, in this case, of fish origin. The relatively high infection rate with *T. leonina* is likely to be reduced after the extensive rodent control campaign which was embarked upon by the Ministry of Public Health shortly after the commencement of this investigation.

It is clear that helminthiasis in dogs in Kuwait is mainly associated with ownerless dogs having an easy access to animal wastes at obattoirs and fish markets but these dogs can also contribute to infection of man. Effective control measures should include serious attempts to eliminate stray dogs and improve sanitary facilities and services, in particular disposal of animal wastes. In view of the public health and economic importance of zoonoses, disease and infections which are naturally transmitted between vertebrate and man, public health and veterinary authorities should be aware of the potential hazards of indiscriminate import of livestock in particular sheep which constitude the main source of meat in Kuwait.

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الديدان المعويّة في الكلاب الضالة في الكويت

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تمت دراسة ميدانية للتعرف على أنواع ومعدلات الإصابة بالديدان المعويّة في الكلاب الضالة في الكويت، في الفترة ما بين ديسمبر ١٩٧٩ وأغسطس ١٩٨٠. وتمخض فحص أمعاء مائتين وثمانية كلاب، عن وجود ستة أنواع من الديدان الطفيلية حسب النسب التالية: ـ

أكينوكوكس كرانيولوساس (١٠,٥٨٪)، دايبليديم كانينام (٠,٤٨٪)، هيتيروفايس (٣,٣٧٪)، تينيا هايداتيجينيا (٣٩,٤٢٪)، انكلستوما كانينام (٠,٤٨٪) توكس اسكارس ليونينا (١٧,٣١٪). والجدير بالذكر أن الأنواع الخمسة الأخيرة وجدت لأول مرة في الكويت.

وقد نوقش مدى تأثير هذه الديدان على صحة الإنسان وكذا الظروف البيئية السائدة التي تساعد على إنتشارها.