

## **Prevalence of intestinal helminths in stray dogs of Kalar city / Sulaimani province**

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### **Summary**

A total of 50 stray dogs, 26 males and 24 females from 3 different areas in Kalar city were killed and autopsied during the period from October 2005 till end of March 2006. The overall infection rates with cestodes and nematodes were 84% and 36%, respectively. No trematodes and acanthocephalans were found in the intestine of the dogs. The rate of infection was 75% in area around abattoir, 92.85% in areas of the periphery of Kalar and 95% in the city center. The following cestodes were identified: *Taenia* spp. (78%), *Dipylidium caninum* (26%), *Diphyllobothrium latum* (2%) and *Mesocestoides* sp. (2%). Only two intestinal nematodes, *Toxocara* sp. and *Ancylostoma caninum* were recovered with prevalence rates of 36% and 2%, respectively.

### **نسبة انتشار الديدان المعوية في الكلاب السائبة في قضاء كلالر / محافظة السليمانية**

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#### **الخلاصة**

لقد تم قتل وتشريح 50 كلباً سائباً (26 ذكراً، 24 أنثى) في 3 مناطق من مدينة كلالر للفترة بين تشرين الأول 2005 واذار 2006. وبينت نتائج الدراسة بأن 44 كلباً (88%) كانت مصابة على الأقل بأحدى أنواع الديدان المعوية. وكانت نسبة الإصابة كلية بالديدان الشريطية والاسطوانية 84% و36% على التوالي. وكانت نسبة الأصابة كلبة 75% في المناطق المحيطة بالمجزرة مقابل 92,85% في المناطق المحيطة بكلالر و 95% في مركز المدينة. ولم يتم العثور على الديدان المثقوبات ومشوكات الرأس في الأمعاء الكلاب مفحوصة. وقد تم العثور على الديدان الشريطية الآتية: *Taenia* spp. بنسبة 78% و *Dipylidium caninum* بنسبة 26% و *Diphyllobothrium latum* بنسبة 2% بينما كانت نسبة الإصابة بالديدان الاسطوانية كالاتي: *Toxocara* sp. بنسبة الإصابة 36% و *Ancylostoma caninum* بنسبة 2%.

### **Introduction**

Dogs (*Canis familiaris*) play role as definitive hosts for a variety of intestinal parasites, some of which like echinococcosis and toxocariasis are helminthic zoonotic diseases that posse a significant economic and public health problems in many parts of the world (1,2 and 3), especially in rural areas where dogs and livestock are raised together (4) and in developing countries where many inhabitants live under poor sanitation conditions (5).

The epidemiology of intestinal helminths in stray dogs in Kurdistan of Iraq has been reviewed by Saida (6) in provinces of Sulaimani, Arbil and Dohuk, by Saeed (7) in Arbil province and (8) in Kalar city. The surveillance and predictive epidemiology are essential for sound knowledge of the taxonomy and transmission cycle which perpetuate the agent in nature, control of any infectious agent, and determining the etiology and appropriate treatment regimes in case of disease (9).

## **Materials and methods**

This study was conducted in Kalar city- Sulaimani province- Kurdistan region- north of Iraq. Fifty stray dogs from different parts of Kalar city were killed by using tablets of strychnine embedded in a piece of esophagus of slaughtered sheep or goat in city center or by shooting in the periphery of Kalar and in areas around abattoir during the period from October 2005 until end of March 2006. A right side abdominal cut was made in each animal and the intestine was tied from the pyloric and anal ends and collected in a bag and carried to the laboratory (central laboratory / Directory of veterinary office/ Garmian) within 1 hour. Each intestine was soaked in formalin 10% in a plastic container for twice weeks.

The intestines were removed from formalin and washed with tap water to get rid from excess formalin. Each intestine was divided into four pieces of equal length. Each piece was subsequently opened along its length and large cestodes and nematodes were removed, the contents washed out to remove gross materials (10). After physical inspection by simple eye lens, the mucosal lining was gently scraped with a spatula into clean Petri dish and the collected intestinal contents were allowed to settle in 1000 ml conical flask graduates. Following several washes (3 times) with tap water, aliquots were examined under a dissecting microscope (11). Isolated cestodes were prepared and stained with carmine stain (12 and 13). Nematode helminth parasites were prepared unstained. After washing three times (15 minutes each) in distilled water to remove any traces of formalin, they were cleared and mounted with glycerin jelly (14). Identification of cestodes and nematodes of present study was based on description by Soulsby (15).

### **Statistical analysis**

Chi-square ( $\chi^2$ ) test was used for statistical analysis of study results using statigraph soft ware program. A *P*- value of  $\leq 0.05$  denoted a statistically significant difference, and the rates of infection of dogs from the various regions were compared in pairs (El-Shehabi *et al.*, 1999).

## **Results**

Table 1. Shows the prevalence of infection in stray dogs in various regions of Kalar city. The overall infection rates with at least one intestinal helminthic parasite (cestodes or nematodes) were observed in 44 dogs with prevalence rate of 88%.

The prevalence rate was 52% for infection with cestodes alone, which is significantly higher than concurrent infection rates with cestodes and nematodes and nematodes alone, with the prevalence rates of 32% and 4%, respectively (Fig1).

Total infection rate with cestodes alone in center was 70% which is significantly higher than periphery (42.85%) and area around abattoir (37.5%). Infection with nematodes alone was recorded in dogs around abattoir only with prevalence rate of 12.5%. Total infection rate with cestodes and nematodes concurrently were 50%, 25%, 25% for dog in the periphery, center of Kalar and around abattoir, respectively.

The prevalence of intestinal helminths in dogs from various regions of Kalar were high, ranging from 75%-95%. The dogs from center of Kalar showed highest prevalence of intestinal helminths infection (95%), while the dogs of around abattoir showed the lowest prevalence (75%). No trematodes and acanthocephalans were found in intestine of any dog inspected in the study.

Table 1 Single and concurrent infection of dogs with intestinal helminthic parasites from various regions of Kalar city (number in parentheses indicates number of dogs examined).

Parasites	Percentage of infected dogs in Kalar city			
	Around abattoir (16)	Periphery (14)	Center (20)	Overall (50)
Cestodes alone	37.5	42.85	70	52
Nematodes alone	12.5	0	0	4
Cestodes and Nematodes	25	50	25	32
Total	75	92.85	95	88

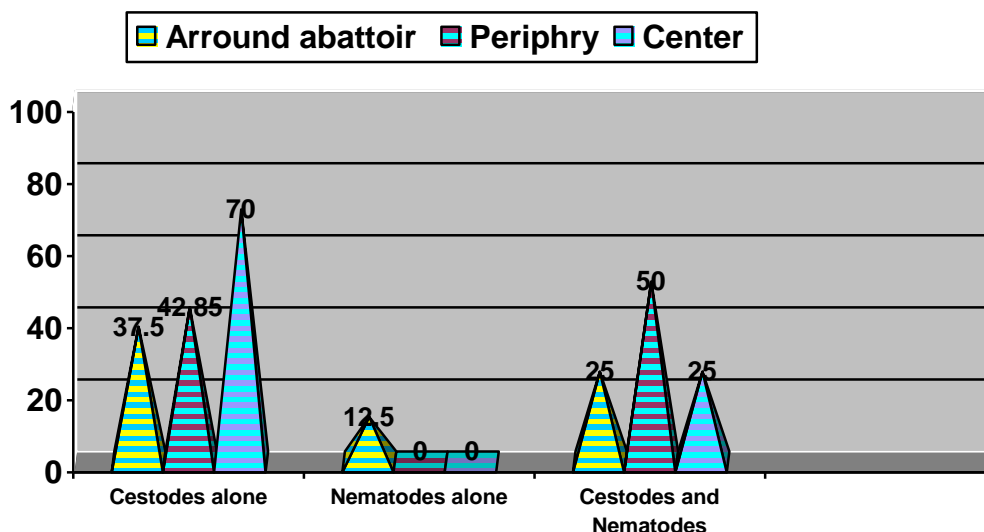


Figure 1. shows the percentage of infection with intestinal helminths in stray dogs in various regions of Kalar city.

Table 2. Shows the overall infection rates with various intestinal cestodes and nematodes which were 84% and 36%, respectively.

Among cestodes, *Taenia* spp. were the most prevalent in dogs with an overall infection rate of 78%, while relatively high prevalence rates for *Dipylidium caninum* (26%) was also recorded. The overall prevalence rate of 2% was recorded for *Diphylobothrium latum* and *Mesocestoides* sp..

High prevalence rate of *Taenia* spp. infection was recorded in the center and periphery than around abattoir of Kalar, while the periphery of Kalar revealed significantly higher prevalence rate (35.7%) for *D. caninum* than around abattoir (18.75%). *Diphylobothrium latum* and *Mesocestoides* sp. were only reported in dogs from around abattoir.

The overall infection rate of dogs infected with nematodes was 36%. The nematodes recovered from intestine of dogs were *Toxocara* sp. and *Ancylostoma caninum* with the overall prevalence rate of 36% and 2%, respectively.

The significantly higher prevalence rate of *Toxocara* sp. was recorded in the periphery (50%) and around abattoir (37.5%) than in the center (25%) of Kalar, while *Ancylostoma caninum* only recovered from a dog in areas around abattoir (6.25%).

Table 2 Percentage of dogs infected with different helminths in various regions of Kalar city (number in parentheses indicates number of dogs examined).

Parasites	Percentage of infected dogs in Kalar city			
	Around abattoir (16)	Periphery (14)	Center (20)	Overall (50)
Cestodes				
<i>Taenia</i> spp.	50	85.7	95	78
<i>Dipylidium caninum</i>	18.75	35.7	25	26
<i>Diphylobothrium latum</i>	6.25	0	0	2
<i>Mesocestoides</i> sp.	6.25	0	0	2
Total	62.5	92.84	95	84
Nematodes				
<i>Toxocara</i> sp.	37.5	50	25	36
<i>Ancylostoma caninum</i>	6.25	0	0	2
Total	37.5	50	25	36

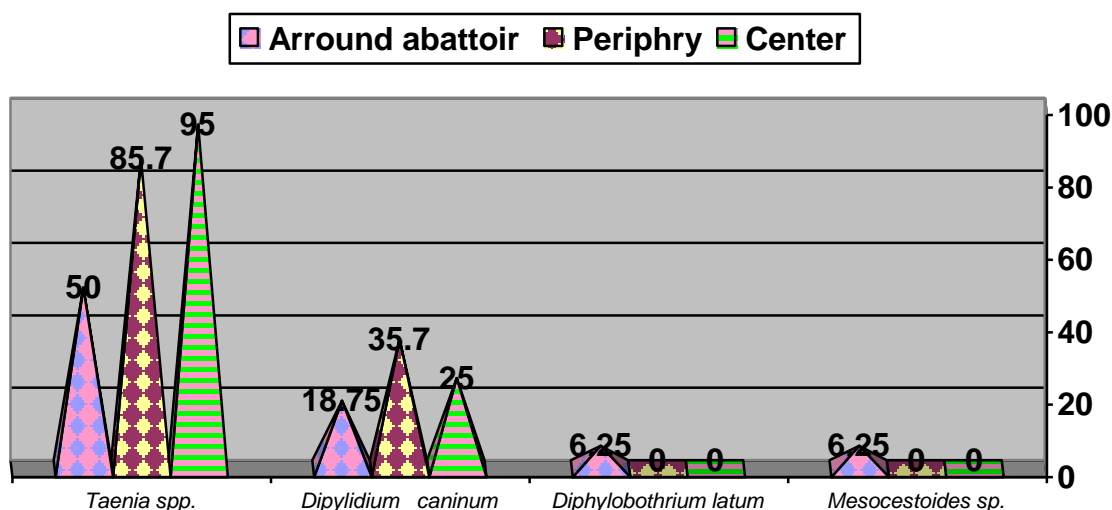


Figure 2. shows the percentage of infection with Cestodes in stray dogs in various regions of Kalar city.

The infection rates with nematodes were low if compared with cestodes infection which ranging from 25-50% with a total infection rate of 36% (18 out of 50 dogs), no significance difference ( $P>0.05$ ) was found between overall infection rate with nematodes and infection with nematodes in different regions of Kalar city Fig3.

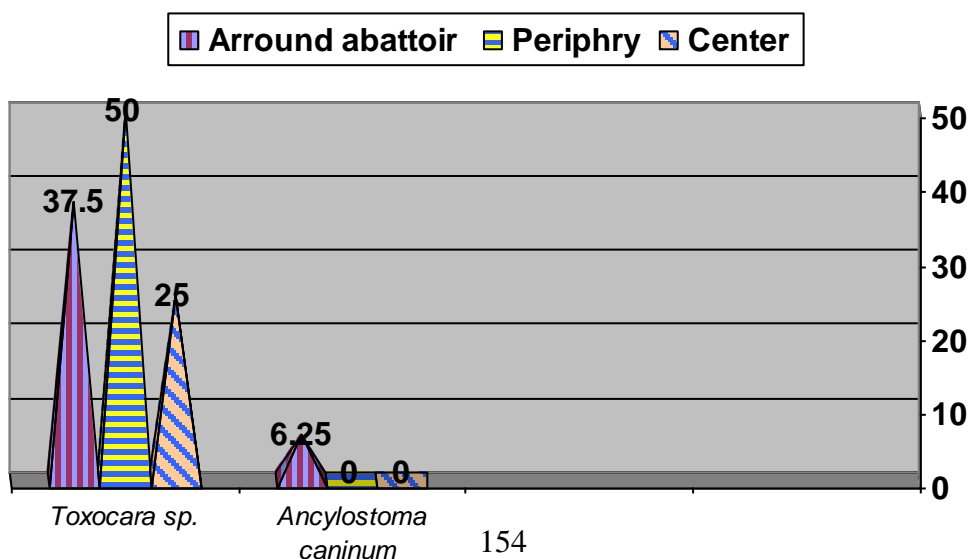


Figure 3. shows the percentage of infection with nematodes in stray dogs in various regions of Kalar city.

### **Discussion**

The epidemiology of intestinal helminths in stray dogs in Kurdistan has been reviewed by Saida (6) in provinces of Sulaimani, Arbil and Dohuk, *Echinococcus granulosus* cestode by Saeed (7) in Arbil province and by Bajalan (8) in Kalar city. The overall infection rate at least with one intestinal helminth (cestodes and nematodes) in dogs was 88% (44 / 50 dogs).

This high prevalence rate with intestinal helminths in Kalar city may be related to the fact that the stray dogs are free and can reach any areas of the city (center or periphery) scavenging through refuses for food, carcasses of dead animals and animal offal's rids by local butchers, restaurants in the city and by people, also related to decrease education of people in the city and in the periphery about the risk of carelessly getting rids of the waste and the probability of transmitting larval stages of parasite to dogs and completing its life cycle, and also related to local government in that, the dogs were high in number and scavenging freely in the city and garbage accumulation inside the city which aid in attracting dogs and also reverse migration of people from villages to the city led to increase number of stray dogs in the city.

The overall infection rate of the present study was higher than that reported in Jordan 70.3%(11) and 67%(16). While the overall prevalence rate of infection with cestodes alone (52%) was lower than the result of the studies in Jordan (62.9%) by El-Shehabi(11) and (58%) by Al-Qaoud (16). The overall infection rate with cestodes and nematodes (32%) and nematodes alone (4%) were higher than results of studies in Jordan 26% and 1.8%, respectively (11 and16 ) with overall prevalence rates of. (6.2%) and (1.8%), respectively.

The overall infection rate with cestodes (84%) was lower than that recorded by(6) with total prevalence rate of (95.4) in provinces of Kurdistan; Arbil (95.5%), Sulaimani (96.5%) and Dohuk (94%). While it was higher than the studies conducted in the neighboring countries, like in Kuwait 23.1% (17), and (14%), (66.8%) and (65.2%) in Jordan by (18,11 and16)

This study also recorded various genus of intestinal helminths recovered, among cestodes *Taenia* species (78%) were recorded high than other genouses of cestode. This result is higher than that recorded by (11 and 16) in Jordan 49.1%, 54.5%, respectively. The prevalence rate of *Dipylidium caninum* was 26% which is in agreement with (19) in the central and south parts of Iraq (25.4%) but lower than the studies in Mosul 40% (20), in Baghdad 50% (21) and in Jordan 32.1% (16), but higher than the study conducted in Jordan 19.4% (11). It is worthy to mention that 20% of the same dogs were infected with *Echinococcus granulosus* (8)*Diphylobothrium latum* commonly called fish tapeworm, its length may reaches up to 20 meters in small intestine of human and compete with the host for vitamin B12 and causes anemia. It was recovered only in one dog with the prevalence rate of 2%. This is lower than result of the study (6) in Zakho city / Dohuk (5.8%) but higher than (11) in stray dogs of Jordan (0.3%).

*Mesocestoides* sp. cestode was recovered in one dog with the prevalence rate of (2%), which is lower than the studies conducted in various regions of Iraq, 33.3% (16) 13.6% (20), 15% (21 and 6) in provinces of Arbil (8.9%), Sulaimani (20.69%) and Dohuk (8.8%), while it is comparable with (11and16) in stray dogs of Jordan (0.9% and 2.7%), respectively. According to the studies mentioned in Iraq, Cestodes in dogs are hyper-endemic and responsible for many zoonotic diseases and public health problems because stray dogs are nearest hidden enemies for public health, which accommodated with human for thousands of years ago, which associate with human and various animals for completing life cycle of many parasitic disease and as a reservoir for many other infectious diseases. The prevalence rate of nematodes alone was recorded only in dogs of around abattoir (12.5%) (table no.1) while higher prevalence rate of cestodes and nematodes was recorded in dogs of the periphery (50%).*Toxocara* sp. and *Ancylostoma caninum* were the only nematodes recovered. High prevalence rate of *Toxocara* sp. was recorded in dogs around periphery of kalar (50%) with overall infection rate of 36%, while *Ancylostoma caninum* recorded only in one dog of around abattoir (6.25%) with an overall prevalence rate of 2%.

This may be due to the fact that dogs of around abattoir colonize and spend most of their times there and they were infected by infective larval stage of *Toxocara* sp. and *Ancylostoma caninum*.

The overall prevalence rate of *Toxocara* sp. was lower than a study conducted (22) in Basrah province (23.5%) but higher than a study carried out in Jordan 1.2% (11).

*A. caninum* was recovered in one dog with prevalence rate of 2% which is comparable with the study in Basrah province 3.9% (22).

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