

A comparison of the prevalence of *Spirocerca lupi* in three groups of dogs with different life and hunting styles

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Abstract

The prevalence of *Spirocerca lupi* in 260 privately owned dogs with different life and hunting styles in Greece was based on the examination of randomly taken faecal samples using Telean's sedimentation technique. The dogs did not demonstrate any clinical signs of spiroceriasis. Although the prevalence was 10%, it was found to be significantly higher in trace hunting dogs (21%), than in scent hunting dogs (5%) and household pets (0%). There was no relationship between prevalence and age/sex of dogs. The impact of life and hunting styles on the prevalence of *S. lupi* in the dog and that of the faecal examination technique, are discussed.

Introduction

The nematode *Spirocerca lupi* (Rudolphi, 1809) is a parasite of carnivores, affecting mainly the dog. It has a worldwide distribution, but is more prevalent in warm climates (Bailey, 1972). Adult worms are found in granulomatous nodules in the oesophagus where they deposit embryonated eggs, which pass into the oesophageal lumen through small fistulous tracts (Bailey, 1972). Various species of dung beetles serve as intermediate hosts and a great variety of animals (e.g. reptiles, birds, and small mammals) as transport hosts (Sen & Anantaraman, 1971; Bailey, 1972; Chhabra & Singh, 1972a, 1973). Spiroceriasis is usually subclinical, but the disease states which have been associated with *S. lupi* infection in dogs may include oesophageal granulomas and sarcomas, aortic scarring and aneurysms, thoracic discospondylitis/spondylosis, hypertrophic osteopathy and salivary gland necrosis (Fox *et al.*, 1988; Johnson, 1992; Schroeder & Berry, 1998). Prevalence values depend mainly on the density of the canine population and the degree of contact between definitive, intermediate and transport hosts (Bailey, 1972). Many aspects of the epidemiology of *S. lupi*, however, remain to be elucidated. The aim of the

present study was to investigate the role of the life style and especially the hunting style of dogs on the prevalence of *S. lupi*.

Materials and methods

Two hundred and sixty privately owned, pet and hunting dogs, which demonstrated no clinical signs of spiroceriasis and resided within a radius of 200 km from the city of Thessaloniki, Greece, were investigated. All these dogs were submitted to the outpatient service of the Companion Animal Medical Clinic, Aristotle University of Thessaloniki, between February 1998 and September 1999, for various medical problems or vaccinations. According to the history of the dogs, no medication had been given prior to admittance.

The dogs were allocated into three groups according to their life and hunting style. Group A included 60 household pet dogs, comprising 33 males and 27 females, with an age range of 6 months to 17 years (mean: 6.07 years). To be eligible for enrolment in the study, group A dogs had to spend more than 80% of their time indoors, and in fact, more than 90% of these dogs lived in apartments. Group B consisted of 100 trace hunting dogs (e.g. Greek hounds, Jura des Alpes), of which 59 were males and 41 females and their age ranged from 7

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Table 1. Breeds of dogs allocated into group A (household pets), group B (trace hunters) and group C (scent hunters).

Dog group	Breed	No. of dogs examined
A (n = 60)	Miniature poodle	13
	Mongrels	21
	English cocker spaniel	9
	Pekingese	6
	Other purebred dogs	11
B (n = 100)	Greek hound	83
	Italian segugio	7
	Beagle	5
	Jura des Alpes	5
C (n = 100)	English pointer	37
	English setter	30
	German shorthaired pointer	14
	Brittany spaniel	9
	Other purebred dogs	10

months to 10 years (mean: 3.81 years). Group C was made up of 100 scent hunting dogs (e.g. English setter, German shorthaired pointer), comprising 56 males and 44 females, with an age range of 7 months to 12.5 years (mean: 3.57 years) (table 1). Telemann's concentration method was carried out on faecal specimens collected directly from the rectum of each dog. Briefly, 1 g of the faecal material was thoroughly mixed with 6 ml of HCl (16%) in a test tube and strained through a sieve (1-mm mesh). An additional volume of 6 ml diethyl ether was also added, the resultant suspension was vigorously shaken for about 30 sec and centrifuged for 1 min at 500 g. After discarding the supernatant fluid, a few drops of the sediment were pipetted onto a glass slide, covered with a coverslip and microscopically screened for the presence of the characteristic barrel-shaped, thick-shelled eggs of *S. lupi*.

The homogeneity of groups with respect to host sex and age was evaluated by the Fischer's exact test and t-test, respectively. A χ^2 -test was used to compare faecal examination results between pet and trace hunting dogs and scent hunting and trace hunting dogs, while a Fisher's exact test was used for the same comparison between pet and scent hunting dogs. Furthermore, the sex and age of *S. lupi* positive dogs was compared with that of their negative counterparts by a χ^2 -test and t-test, respectively. In all statistical tests, the significance was evaluated at the 5% level.

Results and Discussion

Of the 260 faecal specimens collected from the three groups of dogs, 26 (10%) were found to be positive for eggs of *S. lupi*. Group B dogs, were more frequently parasitized (21%), and the difference was statistically significant compared to both group A (0%) ($P < 0.001$) and group C (5%) dogs ($P < 0.001$). The same was also true comparing group C with group A dogs ($P < 0.001$). Dog group homogeneity with respect to sex and age was tested normal, while no association was found between the prevalence of *S. lupi* and the sex or age of dogs.

The present results clearly demonstrate that the

lifestyle of dogs substantially affects infection with *S. lupi* in the different canine populations. This is as expected, as the limited access of household pets to intermediate and paratenic hosts of *S. lupi* minimizes the chances of these dogs picking up the parasite. Although a large portion of indoor dogs in Greece spend summer vacations in the countryside with their owners, the results of the present study indicate that this period of time is not sufficient for *S. lupi* infection to be established. In our experience, *S. lupi*-associated oesophageal nodules are rarely found at post mortem in pet dogs, whereas the opposite is true in hunting and shepherd dogs, especially those that live in the countryside. Eggs of *S. lupi* were detected more often in trace hunters (group B) in comparison to scent hunters (group C). The difference in hunting style between these groups, especially the close contact of the tracers' nose to the ground while they keep track of the prey, may be of crucial importance. Seemingly, these dogs locate dung beetles more easily as they move on the ground in search of food. On the other hand, scent hunters assume a motionless pose (pointing) at the time they sense the presence of the game.

In northern Greece, the prevalence of canine *S. lupi* has been estimated to range from 0.4% (Haralabidis *et al.*, 1988) and 0.8% (Katsinis *et al.*, 1984) to 24.2% (Himonas, 1968). The disparity between these results may lie in the different kinds of canine populations sampled. As in group A dogs, the prevalence of *S. lupi* parasitism reported by Katsinis *et al.* (1984) and Haralabidis *et al.* (1988), may be due to a large number of pets being included in the canine population under investigation. Haralabidis *et al.* (1988), also included hunting dogs, but gave no details of their relative proportion. In addition, records of the Teaching Hospital at the University of Thessaloniki show that pet dogs constitute the larger part of dogs admitted for routine vaccinations, and pet dogs have been the main sources of samples in previous studies. A prevalence value of 24.2% reported by Himonas (1968) which is closer to that of group B dogs, may be due to the fact that only stray dogs were screened. Unlike group B dogs, where the hunting style appears to influence the prevalence of *S. lupi*, the indiscriminate feeding habits of stray dogs considerably raise the likelihood of swallowing both intermediate and paratenic hosts. In the same survey, there was a considerable gap between the prevalence values based on results of faecal examinations (1.53%) and those of necropsy (24.2%) and this may be due to the flotation method used (ZnSO₄ 33.3% solution, specific gravity: 1.142). As nodules of *S. lupi* were found on the oesophageal wall at post mortem in all these cases, it is likely that flotation methods are not suitable for the detection of *S. lupi* eggs, unless the solutions used have a specific gravity between 1.270 and 1.360 (Cabrera & Bailey, 1964; Chhabra & Singh, 1972b; Harrus *et al.*, 1996; Marcovics & Medinski, 1996). Provided that an appropriate technique is used, faecal examination is an acceptable alternative to necropsy in epidemiological surveys on *S. lupi*. However, in such surveys, a small proportion of dogs may exhibit aberrant migrations, harbour *S. lupi* at the prepatent period, or female worms deposit eggs intermittently (Fox *et al.*, 1988). The latter, however, is controversial as some reports lend support to

the view that egg deposition is continuous (Cabrera & Bailey, 1964; Sen & Anantaraman, 1971). Unlike dogs, faecal examination of wild carnivores is unreliable, as most worms fail to reach the oesophagus, thus the presence of aortic lesions is required for a definitive diagnosis (Bailey, 1972; Pence & Stone, 1978).

In conclusion, the present results show that hunting style is an important factor in the acquisition of *S. lupi* infections in the dog and thus, whenever a tracing dog is admitted with signs of oesophageal dysphagia, this nematode should be high on the diagnostic list.

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