

Prevalence of Lungworm Infection in Sheep and Cattle in the Kirikkale province

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SUMMARY: A slaughterhouse survey was performed for one year in order to determine the prevalence and intensity of lungworm infections in both sheep and cattle in the Kirikkale region. Thirty-four percent of 100 sheep examined were infected with lungworms and the species found in the infected lungs were *Cystocaulus ocreatus* (50.0%) and *Dictyocaulus filaria* (23.5%). Mixed infections were detected in 26.5% of the infected lungs. Worm nodules and brood nodules of *C. ocreatus* were observed in the lungs. The range of worm nodules was 1-116 (mean 19.7) and that of brood nodules, 1-5 (mean 2.8) per lung. *D. filaria* had a range that increased to a maximum of 45 worms (mean 11.5). Lungworms were observed in 14.0% of sheep fecal specimens. Larvae of *C. ocreatus* (52.4%) and *D. filaria* (28.6%) were found during examination of feces. Of the feces containing lungworms, 19% showed the presence of mixed infection. Lungworms were not found in cattle examined by autopsy and coprologic examination. *C. ocreatus* is the most prevalent lungworm species in Anatolia. *D. filaria* is another frequently seen lungworm species in Turkey while *Dictyocaulus viviparus* is very rarely reported in this country. It may be related to different humidity and temperature requirements for the development of free living larvae of the two *Dictyocaulus* species.

Key Words: Lungworm, prevalence, sheep, cattle, Kirikkale

Kirikkale Bölgesi'nde Koyun ve Sığırlarda Akciğer Kurtlarının Prevalansı

ÖZET: Kirikkale yöresindeki koyun ve sığırlarda akciğer kılkurdu enfeksiyonunun yayılışını ve yoğunluğunu belirlemek amacıyla bir yıl süreyle mezbahaya gidilmiştir. İncelenen 100 koyunun 34'ünde akciğer kılkurdu saptanmış olup; *Cystocaulus ocreatus* %50, *Dictyocaulus filaria* %23,5, her iki türün bir arada bulunduğu enfeksiyon ise %26,5 oranında tespit edilmiştir. Akciğerde *C. ocreatus*'un parazit ve kuluçka nodüllerine rastlanmıştır. Akciğer başına düşen parazit nodülleri 1-116 (ortalama 19,7), kuluçka nodülleri ise 1-5 (ortalama 2,8) arasında değişmiştir. Enfekte akciğerlerde *D. filaria* en fazla 45 adet bulunmuştur (ortalama 11,5). İncelenen koyun dışkılarının %14'ünde kılkurdu larvasına rastlanmıştır, bu hayvanlarda *C. ocreatus* (%52,4) ve *D. filaria* (%28,6) larvası tespit edilmiş, dışkıların %19'unda ise miks enfeksiyona rastlanmıştır. Hem otopsi hem de dışkı muayenesi sonucunda sığırlarda *D. filaria*'ya rastlanmamıştır. Anadolu'da en yaygın akciğer kılkurdu türü *C. ocreatus*'tur. Diğer yaygın tür *D. filaria* olup, bu parazitle aynı cins içinde yer alan *Dictyocaulus viviparus*'a ülkemizde nadiren rastlanmaktadır. Bu durumun iki *Dictyocaulus* türünün serbest dönem larvalarının gelişmek için farklı sıcaklık ve neme ihtiyaç duyması ile ilgili olabileceği düşünülmüştür.

Anahtar Sözcükler: Akciğer kılkurdu, yayılış, koyun, sığır, Kirikkale

INTRODUCTION

Dictyocaulid and Protostrongylid nematodes cause lungworm infections in ruminants. Dictyocaulidae species are located in the bronchial tree in lungs while Protostrongylidae species are located in the lung parenchyma in the form of brood and worm nodules (13). The number of these nodules was used to estimate the severity of Protostrongylid infections (3).

Lungworm infections are one of the significant losses in productivity of ruminants (14). In Turkey, lungworm infections are more prevalent especially in sheep than other ruminant species. Different lungworm species are reported in sheep in Turkey, however, data on the Protostrongylid infections with respect to severity of infection at that time.

The objectives of the present study were to determine the prevalence and identify the lungworm species in sheep and cattle in Kirikkale province, and to detect the severity of lungworm infection.

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MATERIALS AND METHODS

The study was carried out over a period of one year (October 2002 to September 2003) in Kırıkkale province. The study included visits to the central Kırıkkale Abattoir. Samples of the lungs from 100 sheep and 100 cattle were collected. Faeces samples were also collected from different 150 sheep and 150 cattle. Sheep examined were Akkaraman breed and cattle examined were crossbred. Animals slaughtered originated from farms located in Kırıkkale province. After autopsy, the lung samples were inspected grossly; number and position of the parasitic nodules were recorded and identified. All nodules were examined in detail by dissection. The bronchial tree was opened and all parasites recovered. Then lungs were minced and placed in saline solution in an incubator at 37° C. The lung pieces were removed and remaining fluids were poured through a screen and then the material retained by the screen is washed and fixed by formalin. All worms were identified according to morphological characteristics of parasites (12).

Faecal samples were taken from the rectum of all animals and examined by a Baemann technique.

RESULTS

The infection rate of lungworm in sheep up to 34% was recorded. *C. ocreatus* was only parasite identified in lungs parenchyma. All the worms recovered from the bronchial tree were identified as *D. filaria*. Thus only two species, *C. ocreatus* and *D. filaria* were found in sheep in this work (Table 1).

Cystocaulus ocreatus was the most prevalent lungworm species in Kırıkkale region with a prevalence rate of 50%. *D. filaria*, another lungworm species, was found in lungs infected as a 23.5%. Mix infection was detected (26.5%).

Worm nodules and brood nodules of *C. ocreatus* were detected especially in the diaphragmatic lobes (Fig.1). The number of worm nodules and the brood nodules varied as 1-116 (mean 19,7) and 1-5 (mean 2,8) per animals, respectively. In twenty six sheep, the number of worm nodules was detected as 1-100 (92.3%), however, this number was varied as 100-200 in two sheep examined (7.7%). During this research period, brood nodules were observed only 8 sheep. The infection was classed as the number of brood nodules; five of them as light (62.5%), two of them as medium (25%), one animals as heavy infected.

Individual burdens of *D. filaria* ranged up to a max of 45 worms (mean 11,5). In coprological examination, larvae of *C. ocreatus* (52.4%), *D. filaria* (28.6%) and mix infection was observed (19%) in faeces of sheep examined. *Dictyocaulus viviparus* was not detected either in coprologic examination or during autopsy in cattle.

DISCUSSION

The prevalence of the lungworm infections in sheep in different cities or countries is varying depending on method (au-

topsy or coprological examination), environmental conditions, and situation of infection. In the previous studies, for this reason, different results were reported (29 – 85.21%) in sheep in Turkey (1, 3, 5-8, 15, 17). In the present study, an infection rate of lungworm in sheep up to 34% was recorded.

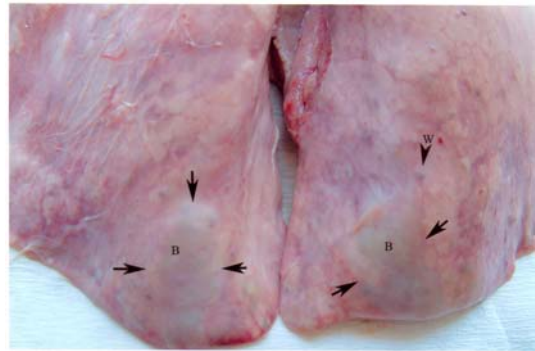


Figure 1. The lungs infected with *C. ocreatus*: **B:** Brood nodule, **W:** Worm nodule

Different lungworm species were reported in sheep in Turkey (Table 2). According to these studies, *C. ocreatus* and *D. filaria* were the more prevalent lungworm species reported in Anatolia (1, 3, 5-8). In the present study, *C. ocreatus* and *D. filaria* were only the lungworm species observed in sheep in Kırıkkale. This result supported to findings of previous studies (1, 3, 5-8).

To estimate the severity of infection based on the number of worm nodules, a light infection contained up to 100 nodules, as medium infection 100-200, and a heavy infection more than 200 nodules (2). In this study, 92.3% were classed as light, only 7.7% as medium infection in sheep examined. The lesions were showed on the diaphragmatic lobes in general. Heavy infection was not detected during the research period according to the number of worm nodule.

Three grades were used to estimate the severity of infection with brood nodules; a light infection contained up to one lesion, as a medium infection two-four lesions, and heavy infection more than four lesions (2). In present study, 62.5% were classed as light, 25% as medium and 12.5% as heavy in infected animals. Brood nodules of *C. ocreatus* were showed on the apex of diaphragmatic lobes in lungs examined.

Individual parasite burdens of sheep infected with *D. filaria* was recorded as 1-14 (11), 1-40 (6) and 1-64 (17) in recent studies of Turkey. Throughout present study this rate ranged up to a maximum of 45 worms, but generally the worm load was smaller, averaging 11,5 per animals.

In previous study, lungworm infection was reported as 14% in sheep in Kırıkkale region with faecal analysis (18). *C. ocreatus* as 52.4%, *D. filaria* as 28.6% and mix infection as 19% were observed with coprological in present study. However, lung-

worm infection detected with autopsy was higher than that of with faecal examination. This difference may be related to worm nodules of *C. ocreatus*. Worm nodules contain immature parasites in general (13). Higher infection rate observed on autopsy examination may be related to these worm nodules detected.

Dictyocaulus viviparus was detected as 0,3-2% in previous studies in Turkey (Table 3) (4, 9, 16,17). However, in a single study, this parasite was reported as 70% in cattle which were

imported from other countries to Turkey (9). *D. viviparus* was detected neither coprologic examination nor autopsy in cattle throughout this study.

Dictyocaulus genus is development directly. The longevity and development of free living larvae of *Dictyocaulus* are know to be dependent on humidity and temperature conditions. Dry season is characterized by high mortality of larvae in pasture (10). Dry, hot summer and cold winter is climatic conditions of Kırıkkale region.

Table 1. The prevalence of lungworms in sheep in Kırıkkale province

No. of examined sheep	Methods of detection used	Prevalence (% positive)	Parasites					
			<i>D. filaria</i>		<i>C. ocreatus</i>		<i>D. filaria</i> + <i>C. ocreatus</i>	
			n	%	n	%	n	%
100	A	34	8	23,5	17	50	9	26,5
150	FE	14	6	28,6	11	52,4	4	19

A: Autopsy; FE: Faecal examination

Table 2. Prevalence of the lungworms in sheep in Turkey (past to present)

City/region	Methods of detection used	No. of examined sheep	Prevalence (positive %)	Parasites detected (max.to min)	References
Ankara	FE	1 890	53,17	<i>C. ocreatus</i> , <i>M. capillaris</i> , <i>D. filaria</i> , <i>N. linearis</i> , <i>Protostrongylus</i> spp.	8
Konya	A	280	38,21	<i>C. ocreatus</i> , <i>D. filaria</i> , <i>P. rufescens</i>	6
	FE	1 200	29,3	<i>C. ocreatus</i> , <i>D. filaria</i> , <i>P. rufescens</i> , <i>N. linearis</i>	7
Samsun	FE	720	45,39	<i>C. ocreatus</i> , <i>M. capillaris</i> , <i>D. filaria</i> , <i>N. linearis</i> , <i>Protostrongylus</i> spp.	3
Elazığ	A	240	42,91	<i>C. ocreatus</i> , <i>D. filaria</i>	15
Trakya	A	136	19,85	<i>D. filaria</i>	11
Kars	A	100	29	<i>D. filaria</i> , <i>C. ocreatus</i> , <i>P. rufescens</i> , <i>P. unciphorus</i> ,	17
	FE	200	50,5	<i>D. filaria</i> , <i>C. ocreatus</i> , <i>Protostrongylus</i> spp., <i>M. capillaris</i>	
Van	A	120	55,33	<i>C. ocreatus</i> , <i>D. filaria</i> , <i>M. capillaris</i> , <i>Protostrongylus</i> spp.	5
	FE	240	85,21	<i>C. ocreatus</i> , <i>D. filaria</i> , <i>M. capillaris</i> , <i>Protostrongylus</i> spp.	
İstanbul	A	96	42,7	<i>C. ocreatus</i> , <i>D. filaria</i> , <i>M. capillaris</i> , <i>P. rufescens</i> ,	1
	FE	600	47,2	<i>C. ocreatus</i> , <i>D. filaria</i> , <i>M. capillaris</i> , <i>Protostrongylus</i> spp.	

A: Autopsy; FE: Faecal examination

Table 3. The prevalence of *D. viviparus* in cattle in Turkey (past to present)

City	Methods of detection used	No. of examined cattle	Prevalence (positive %)	References
Anon.	A	15 328	0,3	16
Bursa	A	*	70	9
Samsun	A	142	0,7	4
Kars	A	100	0	17
	FE	100	2	

A: Autopsy; FE: Faecal examination; *The number of examined cattle was not reported

In conclusion, the infection of *C. ocreatus* in sheep seems to be importance in Anatolia. Land snails are intermediate host of this parasite. In generally snails survive during the dry season, which increases the opportunity of infection of sheep by ingestion of molluscs.

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REFERENCES

1. **Bağcı Ö, Bıyıkoglu G**, 2003. İstanbul'da değişik kombinalarda kesilen koyunlarda akciğer kılkuçlarının yayılışı. *T Parazitol Derg*, 27:139-143.
2. **Berrag B, Cabarret J**, 1997. Assessment of severity of natural infections of kids and adult goats by small lungworms (Protostrongylidae; Nematoda) using macroscopic lesion scores. *Vet Res*, 28: 143-148.
3. **Celep A, Açıcı M, Çetindağ M, Gürbüz İ**, 1995. Samsun yöresi koyunlarında parazitler epidemiyolojik çalışmaları. *T Parazitol Derg*, 19: 290-296.
4. **Celep A, Açıcı M, Çetindağ M, Coşkun ŞZ, Gürsoy S**, 1990. Samsun yöresi sığırlarında helmintolojik araştırmalar. *Etlik Vet Mikrobiyol Derg.*, 6: 117-130.
5. **Değer S, Biçek K, Akdemir C, Taş Z**, 2000. Van Belediye mezbanasında kesilen koyunlarda akciğer kılkuçlarının yayılışı. *YYÜ Vet Fak Derg.*, 27: 215-236.
6. **Dik B, Sevinç F, Güneği HB**, 1993. Konya Et ve Balık Kurumu Kombinasında kesilen koyunlarda akciğer kılkuçlarının yayılışı. *Türk Vet Hek Dern Derg.*, 5: 39-42.
7. **Dik B, Sevinç F, Köse M**, 1995. Konya yöresi koyunlarında akciğer kılkuçlarının yayılışı. *Veterinarium*, 6: 79-81.
8. **Doğanay A, Burgu A, Toparlık M**, 1989. Ankara yöresinde koyunlarda metastrongylose. *Etlik Vet Mikrob Derg.*, 6: 99-113
9. **Ergün H**, 1961. Karacabey harası danalarında Dictyocaulose invazyonu. *Etlik Vet Bak Enstit Derg*, 1: 221-226.
10. **Gallie G.J. And Nunns V.J.** (1976): The bionomics of free living larvae and transmission of *Dictyocaulus filaria* between lambs in North-East England. *J Helminthol*, 50: 79-89.
11. **Gargılı A**, 1995. Trakya'da kıvrıcık koyunlarında akciğer nematodlarının yayılışı. 9. Ulusal Parazitoloji Kongresi, Kemer, Antalya.
12. **Levine ND**, 1968. *Nematode Parasites of Domestic Animals and of Man*. Burgess Publishing Company, USA.
13. **Schnieder T**, 2000: Helminthosen der Wiederkauer. pp.192-295. In: Rommel, M., Eckert, J., Kutzer, E., Korting, W., Schneider, T. (Eds), *Veterinarmedizinische Parasitologie*. 5., Vollständig neubearbeitete Auflage. Parey Buchverlag, Berlin.
14. **Soulsby E.J.L**, 1986. *Helminths, Arthropods and Protozoa of Domesticated Animals*. 7 th Ed, Bailliere Tindall, London.
15. **Taşan E, Köroğlu E, Altaş MG**, 1997. Elazığ bölgesinde akciğer kılkuçlarının yayılışı. *F Ü Sağlık Bil Derg*, 11: 273-276.
16. **Tiğın Y**, 1964. Yurdumuz sığırlarının akciğerlerinde bulunan nematodlara dair sistematik araştırmalar. A.Ü. Veteriner Fakültesi Yayını, 151.
17. **Umur Ş, Özkan MÖ**, 1998. Kars yöresi sığır ve koyunlarında akciğer kılkuçları. *T Parazitol Derg*, 22: 88-92.
18. **Yıldız K, Aydenizöz M**, 2001. Kırıkkale yöresi koyunlarında helmintlerin yayılışı. *Ankara Üniv Vet Fak Derg*, 48: 179-182.