Cryptosporidiosis in Diarrhoeic Lambs on a Sheep Farm

Bülent ULUTAŞ[1], Hüseyin VOYVODA[1]

[1]Adnan Menderes University, Faculty of Veterinary Medicine, Department of Internal Medicine, Aydın

SUMMARY: Total of 144 fecal samples were obtained from diarrheic or non-diarrheic lambs aged from 1 day to 30 days on a sheep farm in the Aydın province. All samples were examined with the Heine's carbol-fuchsin method in the laboratory. *Cryptosporidium* spp. oocysts were found in 67 (46.5%) lambs. Cryptosporidial infection rates were significantly higher in diarrheic lambs (79.1%, 53 of 67) than in non-diarrheic lambs (18.2%, 14 of 77). Statistical analysis showed that infection rates were significantly higher in lambs aged between 1 and 15 days (89.6%, 60 of 67) than in those between 15–30 days of age (10.4%, 7 of 67). Both diarrhea and *Cryptosporidium* spp. oocysts were found in 53 lambs. Diarrhea along with the presence of *Cryptosporidium* spp. oocysts was more frequent ($p<0.001$) in lambs under 15 days of age (96.2%, 51 of 53) than in those aged between 15 and 30 days (3.8%, 2 of 53). The presence of *Cryptosporidium* spp. in lambs on a sheep farm in Aydın region indicates that this protozoon should also be considered in the etiology of lambs with neonatal diarrhea.

Key words: Cryptosporidiosis, lamb, Aydın.

Bir Koyun Çiftliğindeki İshalli Kuzularda Cryptosporidiosis

ÖZET: Aydın yöresinde bir sürüdeki 1-30 günlük, ishalli ve ishalsiz kuzulardan toplam 144 dışkı örneği elde edildi. Laboratuvara getirilen dışkı örnekleri Heine'nin Karbol Fuksin metoduna göre incelendi. İncelenen 144 kuzu dışkısının 67 (%46.5)' sinde *Cryptosporidium* ookistlerine rastlandı. Cryptosporidial enfeksiyon oranı ishalli kuzularda (%79.1, 53/67), ishalsiz kuzulara (%18.2, 14/77) göre önemli düzeyde yüksekti. İstatistiksel analizler, enfeksiyon oranlarının 1-15 günlük kuzularda (%89.6, 60/67) 15-30 günlük kuzulara göre (%10.14, 7/67) önemli düzeyde yüksek olduğunu gösterdi. Toplam 53 kuzuda hem ishal hemde *Cryptosporidium* spp. ookistleri belirlendi. *Cryptosporidium* spp. ookistleri ile birlikte ishal görülme oranı 15 günlük yaşın altındaki kuzularda (%96.2, 51/53) 15-30 günlük kuzulara (%3.8, 2/53) göre daha yüksekti. Sonuç olarak Aydın yöresindeki bir koyun çiftliğindeki kuzularda cryptosporidiosisin varlığı saptandı ve yeni doğan kuzu ishallerinin etiyolojisinde bu protozoonun da dikkate alınması gerektiği kanısına varıldı.

Anahtar Kelimeler: Cryptosporidiosis, kuzu, Aydın

INTRODUCTION

Cryptosporidium spp. is a protozoan parasite of worldwide distribution, with infection reported in over 40 domestic and wild species including mammals, birds, reptiles and fish (6). Cryptosporidial infection of livestock may have an important economic impact to farmers because of high morbidity and sometimes high mortality rates among farm animals. Additionally, infected animals pose a health risk to humans given the zoonotic potential of this parasite, which continues to cause a serious and life-threatening disease in patients with AIDS (12).

The proportion of human cryptosporidiosis of zoonotic origin is unknown, but infection in domestic and wild ruminants provide the greatest source of environmental contamination for human infection either by direct contact or indirectly through fecal contamination of food or water for human consumption (14).

It is well known that most data on the prevalence of cryptosporidial infection in farm animals concern cattle. In comparison, there is less information on the occurrence of cryptosporidiosis in sheep and goats. Barker and Carbonell (2) first described cryptosporidiosis in lambs with diarrhoea in Australia, but no causative role could be ascribed to the organism because of the coincidental infections with pathogenic bacteria. Its role as a primary aetiological agent of diarrhoea in lambs was confirmed in the early 1980s in studies on natural and experimental infections (1, 11). Subsequently, cryptosporidial infection in lambs and goat kids with or without diarrhoea has been reported in many regions in the world (4).

In Turkey, Özer et al. (9) first described cryptosporidiosis in lambs with diarrhoea in east Turkey and since then two studies have been carried out to determine to prevalence of cryptosporidial infection in lambs and goats (5, 10). The

Geliş tarihi/Submission date: 20 Ekim/20 October 2003
Düzeltme tarihi/Revision date: 02 Aralık/02 December 2003
Kabul tarihi/Accepted date: 28 Ocak/28 January 2004
Yazışma /Correspoding Author: Bülent Ulutaş
Tel: - Fax: -
E-mail: bulutas@adu.edu.tr

prevalence of cryptosporidial infection in lambs is not well known in different geographical areas in Turkey. This report records the first outbreak of cryptosporidial infection in lambs in Aydın province.

MATERIALS AND METHODS

The outbreak of diarrhoea started in January 2002 in a lambing barn of a sheep farm in Aydın, western Turkey. This barn housed about 265 ewes, 80 rams and 234 lambs. Problems started with suckling lambs from the lambing periods. Diarrhoea mostly began at 4-5 days of age. High mortality occurred in diarrhoeic lambs and 90 lambs between one and three weeks of age died during the past two weeks. The owner and local veterinarians had tried treatments with medication of antibiotics (enrofloxacin and spectinomycin) or other therapeutic but diarrhoea did not stop. Two weeks later, the investigators from Adnan Menderes University, Veterinary Hospital visited the farm for clinical examination.

Physical examination of the lambs suggested diarrhoea. Faeces were generally watery and greenish-yellow, within 24 hours most of the lambs became desiccated, apathetic and recumbent. A total of 144 faecal samples were obtained from lambs aged from 1 day to 30 days with diarrhoeic or non-diarrhoeic. Lambs were divided into two groups on the basis of age, diarrhoea and oocyst, <15 days old and >15 days old, diarrhoeic and non-diarrhoeic, and oocyst negative and positive, respectively. For each animal, a faecal sample was taken from the rectum by using a disposable plastic bag and disposable plastic containers were used. All samples were examined directly following Heine's technique (7). Chi-square test was used to compare infection rates between different age groups and between diarrhoeic and non-diarrhoeic lambs. A *P*-value <0.05 was required for significance.

RESULTS

Sixty seven lambs were positive for *Cryptosporidium* spp. oocysts, and the prevalence of cryptosporidial infection was 46.5% (67 of 144). Cryptosporidial infection rates were significantly higher (P<0.001) in diarrhoeic (79.1%, 53 of 67) than in non-diarrhoeic lambs (18.2%, 14 of 77) (Table 1).

Table 1. Frequency of detection of *Cryptosporidium* spp. oocysts in lambs

Lambs	n	Oocyst			
		Positive		Negative	
		n	%	n	%
Diarrhoeic	67	53	79.1	14	20.9
Non-diarrhoeic	77	14	18.2	63	81.8
Total	144	67	46.5	77	53.5
		$x^2 = 53.447$***			

*** P<0.001

Statistical analysis showed that infection rates were significantly higher (P<0.001) in lambs aged between 1 and 15 days (89.6%, 60 of 67) than in those of 15–30 days of age (10.4%, 7 of 67) (Table 2).

Table 2. Relationship between age and *Cryptosporidium* spp. oocysts

Lambs	n	Age (day)			
		<15		>15	
		n	%	n	%
Oocyst positive	67	60	89.6	7	10.4
Oocyst negative	77	49	63.6	28	36.4
Total	144	109	75.7	35	24.3
		$x^2 = 13.079$***			

*** P<0.001

Both diarrhoea and *Cryptosporidium* spp. oocysts were reported in 53 lambs. Diarrhoea along with *Cryptosporidium* spp. oocysts was more frequent (p<0.001) in lambs under 15 days of age (96.2%, 51 of 53) than in those aged between 15 and 30 days (3.8%, 2 of 53) (Table 3).

Table 3. Age-related frequency of diarrhoeic lambs with *Cryptosporidium* ssp. oocysts

Diarrhoeic lambs with *Cryptosporidium* ssp. oocysts	Age (day)			
	<15		>15	
n = 53	n	%	n	%
	51	96.2	2	3.8
	$x^2 = 45.302$***			

***P<0.001

Oocysts of *Cryptosporidium* spp. were found in faecal samples, but no other parasite stages could be detected in the faeces of the lambs.

DISCUSSION

Cryptosporidial infection has been associated with diarrhoeal illness in young animals. However, *Cryptosporidium* spp. oocysts have been observed in clinically healthy as well as clinically ill animals. The results of this study confirm that *Cryptosporidium* spp. exist on a sheep farm in this geographical area and should be considered as one of the agents in the aetiology of neonatal diarrhoea in lambs. The results of the study demonstrated that the prevalence of cryptosporidial infection in lambs was 46.5% (67 of 144), whereas other studies (5, 9) reported infection rates in lambs ranging from 12% to 23.3%. Cryptosporidial infection rates were significantly higher in diarrhoeic (79.1%, 53 of 67) than

in non-diarrhoeic lambs (18.2%, 14 of 77). The infection rate reported in this study was higher than in other Turkish studies. The cause of this higher result is the evaluation of one sheep flock's prevalence. The infection rate that noted in our study is in agreement with the other countries' reports which were ranging from 23% to 100% (3, 8, 13, 15). The differences in the frequency of *Cryptosporidium* prevalence in sheep and lambs raised in different geographical regions can be the result of differences in contamination of the environment with oocysts of the parasite or different infectivity of *Cryptosporidium* spp. populations. It is also possible that the quality of zoohygienic conditions of animal husbandry and grazing practices may influence the exposure of animals to cryptosporidial infection. In this study, it is thought that keeping all the lambs together in a narrow area caused high infection rates.

Symptomatic cryptosporidiosis has been reported mainly in lambs less than 1 month of age (13, 15) Clinical infections manifesting themselves in diarrhoea are often associated with high mortality rates in neonates (1, 13). In this study, before the owner has come to our clinic, 90 lambs aged between one and three weeks had died. However, 96.2% (51 of 53) of diarrhoeal lambs with *Cryptosporidium* spp. oocysts and 89.6% (60 of 67) of cryptosporidiosis positive lambs are under 15 days old which shows the importance of the age in the infection. In this period, cryptosporidiosis in lambs is also an important pathogen and must be considered in the diagnosis of neonatal diarrhoea in lambs.

In conclusion, the results of the current study demonstrate that *Cryptosporidium* is involved in the aetiology of lamb neonatal diarrhoea and must be considered as a problem. Some factors may be related to the overcrowding and the hygienic conditions of the lambs' areas. In view of the public health significance of cryptosporidiosis, further studies are needed to assess the impact it may have on the human population and the livestock industry in Turkey.

REFERENCES

1. **Angus KW, Appleyard WT, Menzies JD, Campbell I, Sherwood D,** 1982. An outbreak of diarrhea associated with cryptosporidiosis in naturally reared lambs. *Vet Rec,* 110: 129–130.
2. **Barker IK, Carbonell PL,** 1974. *Cryptosporidium agni sp*. n. from lambs and *Cryptosporidium bovis sp*. n. from a calf with observations on the oocyst. *Z Parasıtenkd,* 44: 289–298.
3. **Causape AC, Quilez J, Sanchez-Acedo C, Del Cacho E, Lopez-Bernad F,** 2002. Prevalence and analysis of potential risk factors for *Cryptosporidium parvum* infection in lambs in Zaragoza (northeastern Spain). *Vet Parasito.,* 104: 287-292.
4. **De Graaf DC, Vanopdenbosch E, Ortega-Mora LM, Abbassi H, Peeters JE** 1999. A review of the importance of cryptosporidiosis in farm animals. *Int J Parasitol*, 29: 1269-1287.
5. **Erman N, Beyazıt A, Öz İ,** 2000. The prevalence of cryptosporidiosis in lambs and goat kids in Izmir province. *J Bor Vet Cont Res Inst,* 25: 33-38.
6. **Fayer R, Ungar BLP,** 1986. *Cryptosporidium* spp. and cryptosporidiosis. *Microbiol Rev.,* 50: 458-483.
7. **Heine J,** 1982. Eine einfache Nachweismethode für Kryptosporidien im Kot. *Zentralbl Veterinarmed B,* 29: 324-327.
8. **Olson ME, Thorlakson CL, Deselhers L, Morck DW, McAllister TA,** 1997. *Giardia* and *Cryptosporidium* in Canadian farm animals. *Vet Parasitol,* 68: 375–381.
9. **Özer E, Erdoğmuş SZ, Köroğlu E**, 1990. Prevalence of *Cryptosporidium* infection in lambs and calves in Elazığ province. *Doğa Turkish J Vet Anim Sci,* 14: 439 – 445.
10. **Özkul IA, Alçığır G, Karaer Z,** 1992. Intestinal cryptosporidiosis causing diarrhoea in goat kids. In: Proceeding of and Papers Presented at V International Conference on Goats. March, 2-8, Held in New Delhi, India.
11. **Snodgrass DR, Angus KW, Gray EW,** 1984. Experimental cryptosporidiosis in germ-free lambs. *J Comp Path.,* 94: 141–152.
12. **Tzipori S, Griffiths JK,** 1998**.** Natural history and biology of *Cryptosporidium parvum*. *Adv Parasitol*, 40: 6–36.
13. **Tzipori, S,** 1998**.** Cryptosporidiosis: Laboratory investigations and chemotherapy. *Adv Parasitol,* 40: 187–221.
14. **Tzipori S, Angus KW, Campbell I, Clerıhew LW,** 1981. Diarrhea due to *Cryptosporidium* infection in artificially reared lambs. *J Clin Microbiol,* 14: 100-105.
15. **Xiao L, Herd RP, Rings DM,** 1993. Diagnosis of *Cryptosporidium* on a sheep farm with neonatal diarrhea by immunofluorescence assays. *Vet Parasitol,* 47: 17–22.