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Prevalence of *Cryptosporidium* spp. Oocysts in Diarrhoeic Calves in Kars Province, Turkey

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Abstract: This study was carried out to determine the prevalence of *Cryptosporidium* spp. oocysts in diarrhoeic calves in Kars province. The study was conducted between February 1999 and June 1999, involving 140 diarrhoeic calves from 8 different localities (Kars-Central district, Karakaş, Bulanık, Karakale, Hacıhalil, Boğazköy, Susuz-Central district, and Arpaçay). These localities were visited once during the study period, and fresh faecal samples were taken from the rectums of the calves up to 3 months old. Faecal samples were centrifuged and the resulting sediments were smeared on glass slides. The slides were stained by the modified acid-fast technique and examined under light microscope for the presence of *Cryptosporidium* spp. oocysts.

Cryptosporidium spp. oocysts were detected in 25.7% (36/140) of the diarrhoeic calves examined. The infection rate varied from 9.1% (1/11) in the Susuz-Central district to 37.5% (6/16) in Arpaçay. The infection rate was 29.5% (33/112) in calves younger than 1 month of age while it was 10.7% (3/28) in calves older than 1 month of age. The highest infection rate of 42.6%, (20/47) was recorded in calves between 1 and 3 weeks of age.

Key Words: *Cryptosporidium* spp., Calves, Prevalence, Kars, Turkey.

Kars İlinde İshalli Buzağılarda *Cryptosporidium* spp. Oocyst'lerinin Yayılışı

Özet: Bu çalışma, Kars yöresinde, diyareli olan buzağılarda *Cryptosporidium* spp. oocyst'lerinin yaygınlığını saptamak amacıyla yapılmıştır. Bu amaçla 1999 yılı Şubat-Haziran ayları arasında odaklara (Kars Merkez, Karakaş, Bulanık, Karakale, Hacıhalil, Boğazköy, Susuz ve Arpaçay) birer defa gidilerek 3 aylığa kadar olan ishalli buzağıların rektumlarından direkt olarak dışkı örnekleri alınmıştır. Bu materyaller santrifüj edildikten sonra sedimentten lam üzerine yaymalar hazırlanmış ve Modifiye Acid-fast yöntemi ile boyanarak Cryptosporidium spp. oocyst'leri yönünden incelenmiştir.

Muayene edilen hayvanların %25.7 (36/140) sinde *Cryptosporidium* spp. oocyst'lerine rastlanmıştır. Yerleşim yerlerine göre enfeksiyon oranları %9.1-37.5 arasında değişmiştir. *Cryptosporidium*'ların yaygınlığı bir aylığa kadar olan buzağılarda %29.5, bir aylıktan büyüklerde ise %10.7 olarak belirlenmiştir. *Cryptosporidium* oocyst'lerine en yüksek oranda (%42.6) 1-3 haftalık buzağılarda rastlanmıştır.

Anahtar Sözcükler: *Cryptosporidium* spp., Buzağı, Yayılış, Kars.

Introduction

Cryptosporidium spp. (Apicomplexa: Cryptosporidiidae) are among the most important coccidian parasites of mammals, birds, reptiles and fish, and are distributed worldwide. These protozoan parasites mainly infect the intestinal tract and rarely the respiratory tract of animals and people. *Cryptosporidium parvum* and *C. muris* are significant species, causing disease in mammals (1,2). *Cryptosporidium* are not host specific so that cross-infection can occur within and between animal species and people.

Cryptosporidium spp. cause an emerging zoonotic disease, Cryptosporidiosis, in a wide range of animals, including newborn ruminants and people. The disease is

characterised clinically by profuse, watery, sometimes mucous, blood-stained diarrhoea, dehydration, emaciation, anorexia, tenesmus and abdominal pain. Disease is more severe and lethal when complicated with other enteropathogens such as *E. coli*, *Salmonella*, Rotavirus, Corona virus infections, and in immuno-compromised individuals (3,4).

Cryptosporidiosis is prevalent in calves and appears to be age related. Infection with *Cryptosporidium* is more commonly reported in calves between 1 and 3 weeks of age (3,5-8).

Studies conducted using different research groups (9-12), have revealed that the prevalence of Cryptosporidiosis in diarrhoeic calves varies between 14.4% and 63.6% (13-16).

Cryptosporidiosis was first diagnosed in calves in Turkey in 1984, which led to several regional studies of the disease (17). Although these studies revealed the prevalence of Cryptosporidiosis to be between 7.2% and 63.3% in diarrhoeic calves (18-21), no prevalence study has been carried out in Kars province, where intensive indoor cattle husbandry is common.

This study was conducted to determine the prevalence of *Cryptosporidium* spp. oocysts in diarrhoeic calves in Kars.

Materials and Methods

This study was carried out between February 1999 and June 1999 in 8 different localities (Kars-Central, Karakaş, Bulanık, Karakale, Hacıhalil, Boğazköy, Susuz-Central and Arpaçay). The animals used in this study were diarrhoeic calves up to 3 months of age. Only one visit was made to each locality and faecal samples were collected from the rectums of the animals. Each sample was put in a sterile plastic bag and taken to the laboratory.

Faecal samples were centrifuged and faecal smears were prepared on glass slides from the resulting sediment. Air or flame dried slides were stained by the modified acid-fast technique and examined under light microscope with 10X40 magnification (22).

Results

The frequency of *Cryptosporidium* spp. oocysts was 25.7% (36/140) in diarrhoeic calves in Kars province (Table 1). When reassessed according to localities, the frequency varied from 9.1% (1/11) in Susuz-Central to 37.5% (6/16) in Arpaçay (Table 1).

Table 1. Regional prevalence of *Cryptosporidium* spp. oocysts.

Localities	X/n	Percentage
Kars-Central	5/24	20.8
Hacıhalil village	4/13	30.8
Karakaş village	7/21	33.3
Susuz-Central	1/11	9.1
Bulanık village	5/22	22.7
Karakale village	3/10	30.0
Boğazköy	5/23	21.7
Arpaçay	6/16	37.5
Total	36/140	25.7

x: Number of animals infected
n: Number of animals examined

The frequency of *Cryptosporidium* spp. oocysts with respect to the age of calves is given in Table 2. *Cryptosporidium* spp. oocysts were detected in calves as young as 3 days old. Calves were recategorised as 1 month old or younger (112 calves), and between 1 and 3 months (28 calves). The frequency of *Cryptosporidium* spp. oocysts was 29.5% (33/112) in diarrhoeic calves 1 month old or younger and 10.7% (3/28) in calves between 1 and 3 months old. In 36 calves infected with *Cryptosporidium* spp. oocysts, diarrhoea was yellowish, watery or mucous in 66.7% (24/36) and grey, greenish or stained with blood in 33.3% (12/36).

Cryptosporidium spp. oocysts 4.7 µm (3.10-5.61 µm) in diameter, were seen as red cells against a blue background with irregularly distributed black granules in it (Figures 1, 2).

Table 2. Prevalence of *Cryptosporidium* spp. oocysts in diarrhoeic calves according to age.

Age	X/n	Percentage
2-7 days	8/41	19.5
8-14 days	11/23	47.8
15-21 days	9/24	37.5
22-30 days	5/24	20.8
>1 month-90 days	3/28	10.7

x: Number of animals infected
n: Number of animals examined

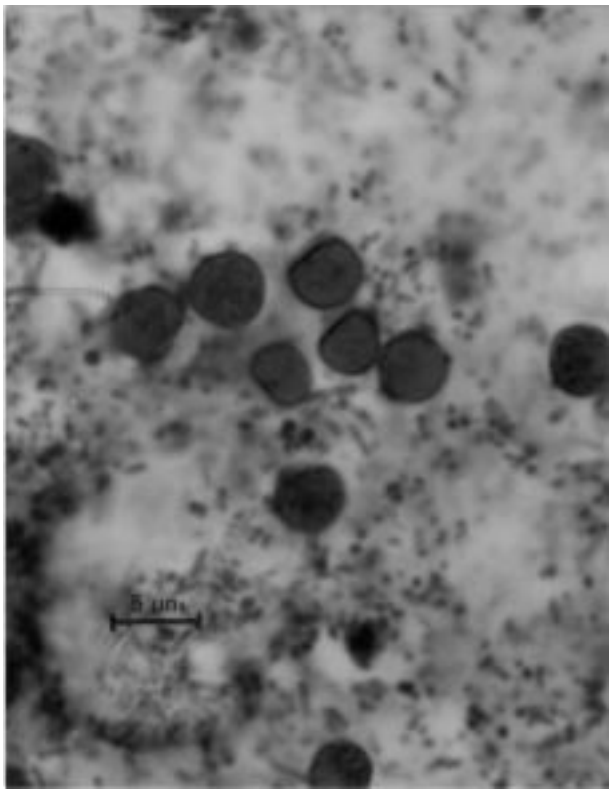

Figure 1. Oocysts of *Cryptosporidium* spp. (X100)

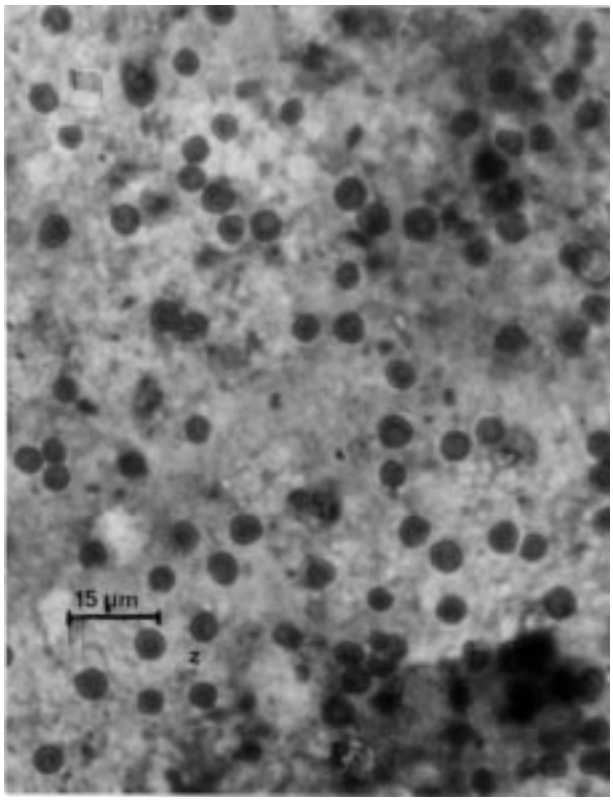

Figure 2. Oocysts of *Cryptosporidium* spp. (X40)

Discussion

Bovine Cryptosporidiosis is reported from all over the world (9-12). Its prevalence appears to be age and management related, especially when overcrowded, unhygienic housing and improper feeding regimens are practised (3,4).

The prevalance of *Cryptosporidium* spp. oocysts in diarrhoeic calves was reported to be 47.7% in France (13), 16.5% in Israel (14), 63.6% in Brazil (15) and 14.4% in Korea (16).

In Turkey, prevalance studies carried out in diarrhoeic calves in Ankara (18,19), Elazığ (20) and Aydın (21) revealed the figures of 48.8-63.3%, 7.2% and 20.6% respectively. The prevalance figure (25.7%) found in the present study was in accordance with the studies mentioned above. The prevalence was higher in animals younger than 1 month old. The infection rate was the highest in calves between 1 and 3 weeks of age. These findings are also similar to the results of other studies.

In this study there was a difference in the prevalance figures obtained from different localities. This may be due to different management systems applied by farmers, but no information about animals and management systems was collected to explain this difference.

This was the first study with the aim of determining the prevalance of *Cryptosporidium* spp. oocysts in calves suffering from diarrhoea in Kars province. This study partially revealed the aetiology of diarrhoea in calves, which should lead the clinician to consider *Cryptosporidium* spp. a cause of diarrhoea and form a base for more broad and detailed epidemiological studies on *Cryptosporidium* spp. infection in this region and Turkey.

References

1. Levine, N.D.: Taxonomy and review of the Coccidian genus *Cryptosporidium* (Protozoa, Apicomplexa). J. Protozool., 1984; 31,(1): 94-98.

2. Upton, S.J., Current, W.L.: The species of *Cryptosporidium* (Apicomplexa: Cryptosporidiidae) infecting mammals. J. Parasit., 1985; 71,(5): 625-629.

3. Fayer, R., Ungar, L.P.: *Cryptosporidium* spp. and Cryptosporidiosis. Microbiological Rev., 1986; 50, (4): 458-483.

4. Taylor, M.A., Webster, K.A.: Recent advances in the diagnosis of *Cryptosporidium*, Toxoplasma, Giardia and other protozoa of veterinary importance in livestock. Res. Vet. Sci., 1998; 65: 183-193.

5. Baljer, G., Eichhorn, W., Göbel, E., Wolf, M., Bachmann, P.A.: Vorkommen und Verbreitung wichtiger Durchfallerreger bei neugeborenen Kalbern in Süddeutschland im Zeitraum 1984-1986. Tierarztl. Umschau., 1987; 42: 56-65.

6. Garber, L.P., Salman, M.D., Hurd, H.S., Keefe, T., Schlater, J.L.: Potential risk factors for *Cryptosporidium* infection in dairy calves. J. Am. Vet. Med. Assoc., 1994; 205(1): 86-91.

7. Maldonado-Camargo, S., Atwill, E.R., Saltijeral-Oaxaca, J.A., Herrera-Alonso, L.C.: Prevalence of and risk factors for shedding of *Cryptosporidium* parvum in Holstein Freisian dairy calves in central México. Prev. Vet. Med., 1998; 36:95-107.

8. Quilez, J., Sanchez-Acedo, C., Cacho, E. Del., Clavel, A., Causape, A.C.: Prevalence of *Cryptosporidium* and Giardia infections in cattle in Aragon (northeastern Spain). Vet. Parasitol., 1996; 66 (3/4): 139-146.

9. Mtambo, M.M.A., Sebatwale, J.B., Kambarage, D.M., Muhairwa, A.P., Maeda, G.E., Kusiluka, L.J.M., Kazwala, R.R.: Prevalence of *Cryptosporidium* spp. oocysts in cattle and wildlife in Morogoro region, Tanzania. Prev. Vet. Med., 1997; 31: 185-190.

10. Olson, M.E., Guselle, N.J., O'Handley, R.M., Swift, M.L., Mcallistes, T.A., Jelinski, M.D., Morck, D.W.: Giardia and *Cryptosporidium* in dairy calves in British Columbia. Can. Vet. J., 1997; 38(11): 703-706.

11. Pérez, E., Kummeling, A., Janssen, M.M.H., Jimenez, C., Alvarado, R., Caballero, M., Donado, P., Dwinger, R.H.: Infectious agents associated with diarrhoea of calves in the canton of Tilaran, Costa Rica. Prev. Vet. Med., 1998; 33: 195-205.

12. Stein, E., Boch, J., Heine, J., Henkel, G.: Der Verlauf natürlicher *Cryptosporidium*-Infektionen in vier Rinderzuchtbetrieben. Berl. Münch. Tierarztl. Wschr., 1983; 96: 22-225.

13. Bourgouin, H.: The place of cryptosporidiosis among the diseases of newborn calves in Corréze. Bulletin des G.T.V., 1996; 2: 19-41. (Ref.: Vet. Bull., 1997, 67, 4, 1925).

14. Brenner, J., Elad, D., Markovics, A., Grinberg, A., Trainin, Z.: Epidemiological study of neonatal calf diarrhoea in Israel - a one year survey of faecal samples. Israel J. Vet. Med., 1993; 48(3): 113-116.

15. Garcia, A.M., Lima, J.D.: Frequency of *Cryptosporidium* in suckling dairy calves. Arq. Brasil. Med. Vet. Zootec., 1993; 45(2): 193-198. (Ref.: Vet. Bull., 1994, 64,2,954).

16. Sunghwan, W., Hoodon, J., Yungbai, K.: Evaluation for detection of *Cryptosporidium* oocysts in diarrheal feces of calves. Korean J. Parasitol., 1996; 34(2): 121-126.

17. Burgu, A.: Türkiye'de buzağılarda *Cryptosporidium*'ların bulunuşu ile ilgili ilk çalışmalar. Ankara Üniv. Vet. Fak. Derg., 1984; 31(3): 573-585.

18. Emre, Z., Fidancı, H.: Prevalence of mix infections of *Cryptosporidium* spp., Escherichia coli K 99 and Rotavirus in the faeces of diarrhoeic and healthy cattle in Ankara, Turkey and in vitro resistance of Escherichia coli K 99 to antimicrobial agents. Tr. J. of Veterinary and Animal Sciences, 1998; 22: 175-178.

19. Irmak, K., Şahal, M.: Buzağılarda deneysel cryptosporidiosis'de klinik bulgular ve sağaltım. Tr. J. Of Veterinary and Animal Sciences, 1993; 17: 81-88.

20. Özer, E., Erdoğmuş, S.Z., Köroğlu, E.: Elazığ yöresinde buzağı ve kuzularda bulunan *Cryptosporidium*'un yayılışı üzerinde araştırmalar. Tr. J. of Veterinary and Animal Sciences, 1990; 14: 439-445.

21. Özlem, M.B., Eren, H., Kaya, O.: Aydın yöresi buzağılarında *Cryptosporidium*'ların varlığının araştırılması. Bornova Vet. Kontr. ve Araşt. Enst. Md., 1997; 22: 15-22.

22. Ok, Ü.Z., Girginkardeşler, N., Kilimcioğlu, A., Limoncu, E.: Dışkı inceleme yöntemleri. Özcel, M.A., Altıntaş, N. (ed.). Parazit Hastalıklarında Tanı. Türkiye Parazitoloji Dern. Yay., Bornova-İzmir, Ege Üniv. Basımevi, pp 1-61; 1997 (No:15).