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Prevalence of Coenurus cerebralis in sheep in Turkey

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Summary

This study was carried out in order to determine the prevalence of Coenurus cerebralis in sheep slaughtered at Konet slaughterhouse between January 10, 2004, and December 31, 2005. Each month, 52 of a total of 624 sheep heads were examined for the presence of C. cerebralis. 102 of these heads were found to be infected with C. cerebralis. The prevalence of the infection was 36.71%, 24.73%, 12.66%, 8.60% and 1.50% in 6 months-1, 1-2, 2-3, 3-4 and 4-and above-year old sheep, respectively. The prevalence of the infection was 18.57% in rams and 15.21% in ewes. 75 of C. cerebralis cysts were found to be located in the left hemisphere, while 66 were located in the right hemisphere. Furthermore, 31.20% of the cysts were found at the parieto-occipital region, 29.08% at the temporal region, 29.79% at the frontal region, and 9.93% were found in the cerebellum. The highest (28.20%) prevalence of infection was determined during the winter season and the lowest (2.56%) during the summer season.

Keywords: Coenurus cerebralis, sheep

Being one of the mortal parasites of sheep, *C. cerebralis*, is the larvae form of the *Taenia multiceps*, a cestode living in the small intestine of canids, such as dogs, foxes and jackals. The larva develops in the spinal cord of sheep, goat, bovine, porcine, deer, equine, camel and human. The cyst exerts stresses on the brain and causes some neural symptoms; it can especially cause atrophy in the skull and consequently, blindness, gnash, vertigo, coordination abnormalities, torticollis, tilting of the head to the left or the right side, anorexia, and mortality (13).

In studies carried out in Turkey, the prevalence of *C. cerebralis* has been reported to range from 1.3% to 36.8% (4, 6, 8, 9, 11, 16, 17). The mortality in *C. cerebralis* infections has been reported to be 100% in Bangladesh (3) and 5% in Ethiopia (2). The prevalence of *C. cerebralis* in sheep was found to be 3% in Jordan (1), 9.8% in Iran (10), and 2.88% in India (15). Various authors have determined that the larvae are mostly found in the parieto-occipital region (4, 6, 7). Sharma et al. (12) have reported that larvae are frequently seen during autumn especially in December in goats in India. On the other hand, Abo-Shehada et al. (1) have reported that these parasites are frequently seen during the winter season in sheep in Jordan.

C. cerebralis is an important problem of sheep in the Konya region. In Turkey, there are 25 431 539 sheep, 1 339 201 of which are in Konya. By the spring, sheep and lambs start to grass at the pastures and each herd contains approximately 1-4 shepherd dogs. Through interviews with owners, it has been determined that none of these dogs were medicated with an antihelminthtic. Therefore, it has reported that in the Konya region the prevalence of *T. multiceps* in dogs is 25% (5). Although veterinarians have implied that the number of deaths due to coenurus is significant in the Konya region, no detailed study has been performed on the prevalence and localization of *C. cerebralis* up to this date.

With this study, prevalence, localization, size, number of *C. cerebralis* in the Konya region and the effect of age and season on the evolution of the parasite are investigated.

Material and methods

Animals and study area. For a year, on every Monday, 12 heads were randomly chosen from the sheep slaughtered at the slaughterhouse and examined for the presence of *C. cerebralis*, and the cyst of *T. multiceps*. Age and gender of each animal was determined. 210 of the animals were males and 414 females. 624 sheep were selected from 288 different herds within 17 040 sheep. Animals slaughtered at Konet abattoir are destined for both local consumption and export. The region (Central Anatolia) has a climate that is hot and dry in the summer, cold and rainy in winter seasons. The region is located at 1016 m above sea level and between latitudes 37.59 N and 32.34 E. The region is largest earth of Turkey (38 257 km^2). Monthly average temperatures range from a minimum of 18°C to a maximum of 25.3°C. The lowest temperature during winter is

approximately –12.8°C, while it rises to 37.0°C in July. The yearly average rainfall is a maximum of 68.8 mm in November and a minimum of 0.1 mm in August.

Parasitological methods. The heads cut in the Konet slaughterhouse were peeled and put in a nylon bag and sent to the parasitology laboratory. The heads were opened by electrical saw and brains were extracted. Brains were sliced into thin slices and checked for the presence of cyst. Detected cysts and the brain were kept in 10% formaldehyde and 70% alcohol.

Statistical methods. The chi-square test was applied for comparison of age groups.

Results and discussion

In the examinations, 102 of the brains extracted from 624 sheep heads were found infected with *C. cerebralis*, the larva form of *T. multiceps*. 98 of the infected brains contained 1 cyst; 12 contained 2 cysts, 5 contained 3 cysts, and 1 contained 4 cysts; a total of 141 cysts were found. It was observed that cysts with a superficial location in the brain caused deformation and thinning of the skull. In addition, it was found that cysts caused brain atrophy and tissue deformation. 75 of 141 cysts were found in the left and 66 in the right hemisphere. 9 of 14 cysts found in the cerebellum were detected in the left and 5 in the right cerebellum (tab. 1). 31.20%, 29.08%, 29.79% and 9.93% of larvae were detected in the parieto-occipital, temporal, frontal regions of the brain and the cerebellum, respectively. Diameters of the cysts were ranged from 1 to 5.8 cm. In infected sheep, cysts were detected at least (1.50%) in sheep above 4 years of age and mostly (36.71%) in sheep between 6 months and 1 year of age; the infection range is presented in tab. 2. Prevalence of the infection in females was 15.21%, while it was 18.57% in males. No cysts were detected in sheep in July and August and the highest prevalence was detected in March 36.53% (fig. 1). Respectively, 1, 2, 3, 4 and 5 larvae were detected in 98, 12, 5, 1 and 2 sheep brain infected with *Coenurus cerebralis*.

The chi-square test was applied for comparison of age groups. There was no difference between 2-3 year-old groups and 3-4 year-old groups, while other groups were significantly different from each other $p < 0.05$

In studies carried out in Turkey, the prevalence of *C. cerebralis* has been reported to range from 1.3% to 36.8% (4, 9, 8, 11, 14, 17). It has been reported that in Istanbul 24.61% (6) and in Karacabey farm, 20% (16) of sheep death have been due to coenurus. In studies conducted in several countries, the prevalences of larvae were found to be 3% in Jordan (1), 4.5% in Ethopia (2), and 9.8% in Iran (10). In the present study carried out in the Konya region on Akkaraman Sheep, the prevalence of *C. cerebralis* was found to be 16.35%. The reason for the fact that the prevalence of this cyst show variation according to the country, is supposed to be climatic, geographic and social conditions. This larva was detected at a ratio of 53.19% in the left hemisphere and 46.81% in the right hemisphere of the brain. According to the localization in the brain, the cysts were found mostly in the parieto-occipital region at a rate of 31.20% and least in the cerebellum at a rate of 9.93%, these results being similar with those in other studies (4, 6, 7). The prevalence of infection was 32.69% in February and 36.54% in March; on the other hand, no infection was found in July and August. In this study, the infection was found mostly (28.20%) during the winter season and least (2.56%) in the summer season. These results are similar to Abo-Shehada's et al. (1) study in Jordan.

The prevalence of infection was especially high (36.71%) in 158 of 6 month-1-year-old sheep, and low (1.50%) in 201 of 4-year or older sheep. Some authors

Tab. 1. Locations of *Coenurus cerebralis* in the brain of naturally infected sheep

Location in the brain	Right cerebrum	%	Left cerebrum	%	Total cysts	%
Parioto-occipital	18	12.76	24	17.02	42	31.20
Frontal	20	14.18	21	14.89	41	29.79
Temporal	23	16.31	21	14.89	44	29.08
Cerebellum	5	3.54	9	6.38	14	9.93
Total	66	46.81	75	53.19	141	100

Tab. 2. Prevalence of *Coenurus cerebralis* among the different age groups of sheep in Konya

Age	Sheep number examined	Infected sheep number	%
6 month-1 years	158	58	36.71
1-2 years	93	23	24.73
2-3 years	79	10	12.66
3-4 years	93	8	8.60
≥ 4	201	3	1.50

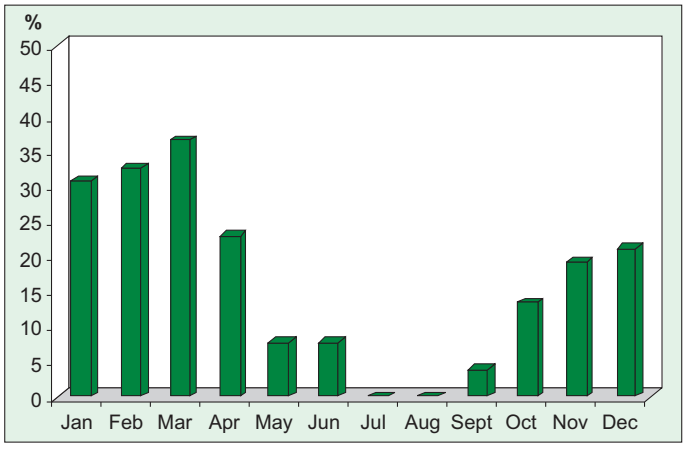

Fig. 1. Montly prevalance of *Coenurus cerebralis* among sheep in Konya during Jan 2005 - Dec 2005

(1, 2) have reported that sheep are mostly susceptible at 0-2 years of age. These results support our results.

The cyst sizes ranged from 0.3 to 4.2 cm according to Bıyıkoğlu (6); from 1.7 to 6.3 cm according to Akkaya and Vurusaner (4); from 0.8-6.5 cm according to Achenef et al. (2); from 1 to 5.8 cm in the current study, this result being similar to other studies.

The considerably high prevalence of infection found in this study demonstrates that the disease has reached a critical point. We think that one of the reasons can be attributed to getting large sheep herds to grass in a contaminated region permanently as result of a significant reduction of pastures. In interviews with owners, it has been determined that shepherd dogs have never received medication against *T. multiceps* and have been fed with raw offal including sheep heads and that they feed large herds in insufficient pastures.

In conclusion, *C. cerebralis* is an important challenge in the Konya region for sheep. Therefore, to prevent sheep from this parasite, people should be made conscious of this disease; dogs should be prevented from feeding on sheep heads; and dogs should be medicated with an efficient drug and pastures should be used more consciously.

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