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Araştırma Makalesi / Research Article

Prevalence of *Coenurus cerebralis* in Sheep in Iğdır Region

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Abstract

Taenia multiceps (*T. multiceps*) settles in the small intestines of their final hosts (dog, fox, wolf, coyote, etc.). The larval form of the parasite shaped in the intermediate host is called *Coenurus cerebralis* (*C. cerebralis*) and is seen primarily in herbivores such as sheep, rarely goats, cattle, deer, pigs, camels, and horses. With this study, it was aimed to determine the prevalence of *C. cerebralis* in Iğdır province, since coenurosis was observed in the brains removed from the opened skulls of sheep slaughtered in the slaughterhouse. The study was carried out by visiting two private slaughterhouses in Iğdır once a week between January 1 and December 31, 2021. In the study; Sheep and lambs showing symptoms such as ataxia, incoordination, teeth grinding and spinning around with ante-mortem examination were included in the study. In the study, the prevalence of *C. cerebralis* in the Iğdır region was 28.1% (474/1688), and the highest rate was observed in 8-12 months old lambs %46 (435/945). In addition, the prevalence of *C. cerebralis* was highest in October with a rate of 46.6% (73/160). As a result; In order to reduce the prevalence of *C. cerebralis*, which is a herd problem in the province of Iğdır, one of the regions where sheep breeding is intense; we think that dogs that have an active role in transmission should be treated with effective antiparasitic drugs and slaughtering should be done in slaughterhouses to prevent contamination.

Keywords: *Coenurus cerebralis*, Iğdır, Sheep

INTRODUCTION

Taenia multiceps (*T. multiceps*), son konakçılarının (köpek, tilki, kurt, çakal vb.) ince bağırsaklarına yerleşir (Scala et al., 2006). The larval form of the parasite, which is formed in the intermediate host, is called *Coenurus cerebralis* (*C. cerebralis*) and is rarely seen in herbivores such as sheep, goats, cattle, deer, pigs, camels, and horses (Yılmaz et al., 2014). This zoonotic larva rarely settles in the brain and spinal cord of humans and forms cysts (Antonios and Mina, 2000; Scala et al., 2006). The larva, which settles in the central nervous system (CNS), primarily the brain in the intermediate host, forms a transparent sac consisting of many scolexes, 0.3-9.5 cm in size, filled with clear liquid (Gökpinar and Yıldız, 2012; Biçek et al., 2019). While *Coenurus cerebralis* initially causes purulent meningoencephalitis, it may cause CNS-related symptoms that can lead to death after the development of the cyst (Christodouloupoulos, 2007). The most characteristic clinical findings are observed in the 2-8 month period after ingestion of the agent (Sharma and Chauhan, 2006). Clinical findings are in the form of locomotor symptoms. In relation to the pressure exerted by *Coenurus cerebralis* on the brain and the location of the cyst in the CNS; The animal tilts its head to the side where the cyst is located, makes a rotational movement while walking, and hits right and left because it cannot hold its head properly. Moreover; Ataxia, incoordination, parasis, torticollis, grinding of teeth, blindness, coma, cerebral atrophy, deformation/thinning of skull bones and different clinical symptoms can be seen, up to death (Akkaya and Vuruşaner, 1998; Ozmen et al., 2006;). Although clinical findings

lead to suspicion of the disease, the definitive diagnosis is made by the presence of parasitic cysts in the brain at necropsy (Sharma and Chauhan, 2006). With this study, it was aimed to determine the prevalence of *C. cerebralis* in Iğdır province, since coenurosis was observed in the brains removed from the opened skulls of sheep slaughtered in the slaughterhouse.

MATERIAL and METHOD

Animal material

Sheep and lambs slaughtered in two private slaughterhouses in Iğdır province constituted the material of the study. The study was carried out by visiting both slaughterhouses once a week between January 1 and December 31, 2021. In the study; Sheep and lambs showing symptoms such as ataxia, incoordination, teeth grinding and spinning around with ante-mortem examination were included in the study. The skulls of animals showing these clinical symptoms were taken and post mortem examination was performed.

Statistical analysis

The statistical comparison of the data was performed using the SPSS® software program (SPSS 26.0, Chicago, IL, USA). Chi-square (X^2) test was used to compare the incidence of *C. cerebralis* in sheep and lambs according to age and gender.

RESULTS

In the study; 945 (520 males, 425 females) 8-12 months old, 375 (225 male, 150 female) 13-24 months old, 368 (230 male, 138 female) Morkaraman sheep breeds were used. The prevalence of *C. cerebralis* in the sheep in the study according to age, months and sex is presented in Table 1.

Table1. Prevalence of *C. cerebralis* in sheep by age, months and sex

Months	Age						TOTAL (x/n), (%)
	8-12 Month		13-24 8-12 Month		2-36 8-12 Month		
	Male (x/n), (%)	Female(x/n), (%)	Male (x/n), (%)	Female (x/n), (%)	Male (x/n), (%)	Female (x/n), (%)	
January	25/40 (%62.5)	12/30 (%40)	3/30 (%10)	2/15 (%13.3)	1/15 (%6.6)	1/5 (%5)	44/135 (%32.6)
February	21/45 (%46.6)	23/35 (%66)	4/30 (%13.3)	1/20 (%5)	0/10 (%)	0/3 (%)	49/143 (%34.3)
March	18/40 (%45)	19/40 (%47.5)	3/35 (%8.6)	1/20 (%5)	0/15 (%)	0/14 (%)	41/164 (%25)
April	23/50 (%46)	26/40 (%65)	6/40 (%15)	0/15 (%)	0/20 (%)	0/12(%)	55/177 (%31.1)
May	16/40 (%40)	29/45 (%64)	1/20 (%5)	0/10 (%)	0/25 (%)	0/20 (%)	46/160 (%28.8)
June	8/30 (%26.6)	0/20 (%)	2/10 (%20)	0/10 (%)	0/40 (%)	0/10 (%)	10/120 (%8.3)
July	3/35 (%8.6)	0/15 (%)	0/5 (%)	0/5 (%)	0/10 (%)	0/15 (%)	3/85 (%3.5)
August	2/30 (%6.7)	0/15 (%)	0/10 (%)	0/8 (%)	0/30 (%)	0/5 (%)	2/98 (%2)
September	16/40 (%40)	0/20 (%)	0/10 (%)	0/10 (%)	0/10 (%)	0/21 (%)	16/111 (14.4)
October	28/50 (%56)	41/60 (%68.3)	1/5 (%20)	0/15 (%)	2/20 (%10)	1/10 (%10)	73/160 (%46.6)
November	32/60 (%53.3)	26/55 (%47.3)	2/20 (%10)	1/10 (%10)	3/25 (%12)	1/8 (%12.5)	65/178 (%36.5)
December	41/60 (%68.3)	26/50 (%52)	1/10 (%10)	0/12 (%)	1/10 (%10)	1/15 (%6.6)	70/157 (%44.6)
TOTAL	233/520 (%44.8)	202/425 (%47.5)	23/225 (%10.2)	5/150 (%3.3)	7/230 (%3)	4/138 (%2.9)	474/1688 (%28.1)

x=number of infected sheep; n= Number of sheep examined

In the study, the prevalence of *C. cerebralis* in the Iğdır region was 28.1% (474/1688), and the highest rate was observed in 8-12 months old lambs %46

(435/945; Table 1). In addition, the prevalence of *C. cerebralis* was highest in October with a rate of 46.6% (73/160; Table 1).

Table 2. *C. cerebralis* incidence rate by age of sheep

Age	<i>C. cerebralis</i>		Total
	Positive	Negative	
8-12 months	435	510	945
	46,0%	54,0%	100,0%
13-24 months	28	347	375
	7,5%	92,5%	100,0%
≥25 months	11	357	368
	3,0%	97,0%	100,0%
Total	474	1214	1688
	28,1%	71,9%	100,0%

$\chi^2= 344,414$ $P=0,000$ $P<0,001$

The incidence of *C. cerebralis* in young animals (8-12 months old) was determined as 46%, and the difference

was found to be statistically significant ($P<0,001$; Table 2).

Table 3. *C. cerebralis* incidence rate by gender

Sex	<i>C. cerebralis</i>		Total
	Positive	Negative	
Male	263	712	975
	27,0%	73,0%	100,0%
Female	211	502	713
	29,6%	70,4%	100,0%
Total	474	1214	1688
	28,1%	71,9%	100,0%

$\chi^2=1,399$ $P=0,237$ $P>0,05$

In the study, although *C. cerebralis* was seen numerically higher in female animals than in males, no significant difference was found in terms of statistical pain ($P>0,05$; Table 3). After the portmortem examination, fluid cysts formed by *C. cerebralis* were

determined in the cerebellum. In addition, scolexes of the parasite were found in these cysts (Figure 1-2). Malasias formed by *C. cerebellaris* during their migration and suppurative meningoencephalitis were observed (Figure 2).



Figure 1. Sheep, *C. cerebellaris* cyst (arrow) and scolexes (arrowhead) of this parasite

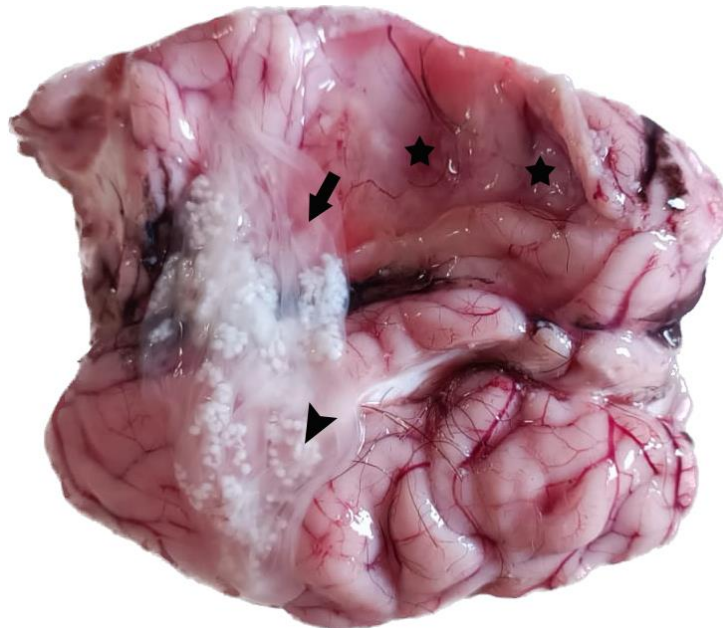


Figure 2. Sheep, *C. cerebellaris* cyst (arrow) and scolexes of this parasite (arrowhead). Supplementary meningoencephalitis and malazik areas (star).

DISCUSSION and CONCLUSION

The eggs of *T. multiceps*, which are excreted with the feces of the last hosts (dog, fox, wolf, coyote, etc.) and released by the fragmentation of the rings, are taken orally by the intermediate hosts (sheep, goats, cattle, horses and humans) and go to the brain and spinal cord via blood. Larvae called *C. cerebralis* develop in these organs (Avcioğlu et al., 2011; Gökçe et al., 2013). Pasture livestock and shepherd dogs are of great importance in the transmission of the agent (Herbert et al., 1984; Avcioğlu et al., 2011). This study was carried out to determine the prevalence of *C. cerebralis*, which causes great economic losses in many countries (Sharma ve Chauhan, 2006), in Iğdır province. Because the development of *C. cerebralis* requires a long incubation period, disease-specific clinical symptoms appear approximately 3 months after ingestion of the parasite (Gül et al., 2007). In intermediate mansions; In the acute period, when a large number of eggs are removed, an acute traumatic meningoencephalitis develops and death occurs in a short time. In the chronic period, which occurs with the removal of a small number of eggs, 1-2 cysts may develop in the brain 4-6 months after the eggs are removed (Gökçe et al., 2013). In the studies carried out; It has been reported that the prevalence of *C. cerebralis* in Turkey is between 1.3-36.8% (Akkaya and Vuruşaner, 1998; Uslu and Güçlü, 2007). In our study, it was determined that the prevalence of *C. cerebralis* in sheep in the Iğdır region was 28.1%. It is thought that this situation is due to the high range of pasture livestock in the region and the insufficient application of parasitic drugs. In a study, it was reported that the prevalence of *C. cerebralis* was 15% in 1-year-old lambs, 21.7% in 2-year-old sheep and 11.4% in 3-year-old and older

lambs (Gıcık et al., 2007). In another study, it was reported that the prevalence of *C. cerebralis* was 42.02% in the 6 months-2 age range, 22.05% in the 2-4 age range, and 8.92% in 4 years old and older sheep (Tavassoli et al., 2011). In a study conducted in Van province, it was reported that the prevalence of *C. cerebralis* was 46.9% in lambs aged 0-1 years, and this rate decreased with increasing age (Biçek et al., 2019). In our study, the prevalence of *C. cerebralis* was determined as 46% in 8-12 month old lambs, 7.47% in 13-24 month old sheep and 2.99% in 25-36 month old lambs in Iğdır province. Studies have shown that as age increases, an acquired immunity against the agent develops (Gemmell et al., 1987; Yılmaz et al., 2014). In our study, supporting the literature, it was determined that *C. cerebralis* was more common in young animals and there was a statistically significant difference between *C. cerebralis* and age ($P<0,001$). Studies have reported that *C. cerebralis* is mostly seen in autumn and winter months (Uslu and Güçlü, 2007; Gıcık et al., 2007; Tavassoli et al., 2011). In another study, it was reported that *C. cerebralis* was most frequently seen in November (10.4%), followed by October (8.3%) (Biçek et al., 2019). In our study, the highest prevalence of *C. cerebralis* was seen in October with a rate of 46.6%, followed by the highest rate in December with a rate of 44.6%. It can be said that the difference between the months is due to regional and climatic differences. Therefore, it will be useful to make a distribution chart according to these months in the sprayings to be made to reduce the prevalence of *C. cerebralis*. As a result; In order to reduce the prevalence of *C. cerebralis*, which is a herd problem a rate of 28.1% in the province of Iğdır, one of the regions where sheep breeding is intense; we

think that dogs that have an active role in transmission should be treated with effective antiparasitic drugs and slaughtering should be done in slaughterhouses to prevent contamination.

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