

A SURVEY OF *TOXOCARA VITULORUM* IN ANATOLIAN WATER BUFFALOES (*BUBALIS BUBALIS*) IN DIYARBAKIR, TURKEY

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ABSTRACT

Toxocara vitulorum is a pathogenic gastrointestinal nematode found in cattle and buffaloes all over the world, especially in tropical and subtropical regions with humid climates. Buffalo farming is a sector whose value has increased in recent years in Turkey and is intensively performed to obtain various products such as milk, cream, meat, and horns. This study aims to determine the prevalence of *T. vitulorum* in Anatolian Water Buffaloes in Diyarbakır. Fresh stool samples from animals were placed in individual stool containers. The sex and age of the animal were recorded for each sample collected. The samples were evaluated under the light microscope after the application of the Fulleborn saturated salt solution method and under Scanning Electron Microscope. Positivity was detected in 5 (3.01%) of the 166 samples. Regarding prevalence by age groups, *T. vitulorum* was detected in 10% of the 0-6 month group, 4.17% of the 6-12 month group, and 0.89% of the older than 12 months group. The prevalence by sex was determined as 3.85% for females and as 1.61% for males. To determine the epidemiology of the disease in the region, it was concluded that larger herds should be studied and serological and molecular methods should be used to confirm and support the findings of microscopic methods.

Keywords: Anatolian Water Buffalo, *Toxocara Vitulorum*, Diyarbakır, Turkey

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INTRODUCTION

Buffalo farming is a sector whose value has increased in recent years in Turkey and is intensively performed to obtain various products such as milk, cream, meat, and horns (Gürler and Gürler, 2018). The buffaloes grown in Turkey originate from the Mediterranean buffaloes, a subgroup of the water buffaloes, and are called the Anatolian water buffaloes (Atasever and Erdem, 2008; Şahin *et al.*, 2013; Yılmaz and Kara, 2019).

Toxocara vitulorum is a pathogenic gastrointestinal nematode found in cattle and buffaloes all over the world, especially in tropical and subtropical regions with humid climates (Umur and Gıcık, 1995; Abdel-Rahman and El-Ashmawy, 2013; Rast *et al.*, 2013; Raza *et al.*, 2013; Raut *et al.*, 2016; Biswas *et al.*, 2021). Adults of this parasite are 15-30 cm long and live in the small intestine of the host (Raza *et al.*, 2013). The hosts most commonly infected with *T. vitulorum* are *Bubalis bubalis* and *Bos taurus* (Raut *et al.*, 2016). Since young buffalo calves are definitive hosts, *T. vitulorum* is among the most destructive parasites of young ruminants and causes significant economic losses (Ferreira and Starke-Buzetti, 2005; Abdel-Rahman and El-Ashmawy, 2013; Raza *et al.*, 2013).

T. vitulorum infection is transmitted vertically from buffaloes to buffalo calves (Rajapakse *et al.*, 1994). While it is mostly transmitted to calves by transplacental and transclostral routes, contamination with water and feed is very rare (Ferreira and Starke-Buzetti, 2005; Raza *et al.*, 2013; Gürler and Gürler, 2018). The disease is common, especially in buffalo calves that are 15-90 days old (Starke-Buzetti *et al.*, 2001).

Digestive disorders such as loss of appetite, abdominal pain, dehydration, weight loss, diarrhea or constipation are seen in infected buffalo calves (Umur and Gıcık, 1995; Raza *et al.*, 2013). In addition to infecting *T. vitulorum* bovinds, it can cause visceral larval

migrans due to its zoonotic feature (Biswas *et al.*, 2021).

The diagnosis of *T. vitulorum* infection can be made by clinical signs, autopsy findings, stool examination for eggs, and serological tests (Parihar *et al.*, 2022). Since parasite eggs are seen in buffalo calves after 3-4 weeks at the earliest, it is very difficult to detect the presence of parasites by stool examination in the first months (Gürler and Gürler, 2018).

In Turkey, buffaloes are mostly found in the provinces of Samsun, Sinop, Çorum, Amasya, Afyon, Balıkesir, Sivas, Muş and Diyarbakır (Atasever and Erdem, 2008; Yılmaz and Kara, 2019). However, studies on buffaloes are very limited. This study was carried out to determine the prevalence of *T. vitulorum* in buffaloes in Diyarbakır.

MATERIALS AND METHODS

Study area and population

This study was carried out in Diyarbakır province located in the Southeastern Anatolia Region of Turkey (370.52' N, 400.13' E) (Figure 1).

The animal material of the study consisted of 166 Anatolian Water Buffaloes of different sexes and ages (Figure 2). Fresh stool samples from animals were placed in individual stool containers. The sex and age of the animal were recorded for each sample collected. The samples were brought to the laboratory in the cold chain rules and stored at +4°C until analyzed.

Laboratory analysis

Stool samples brought to Van Yüzüncü Yıl University, Faculty of Veterinary Medicine, Genetics laboratory were evaluated under the light microscope (Leica, Hamburg, Germany) after the application of the Fulleborn saturated salt solution method (Figure 3).

For Scanning Electron Microscope images of the samples (Sigma 300 Zeiss, Germany), they were first dropped on glass slides and

allowed to dry under room conditions. Then, the dried samples were coated with an Au sputter coater device for 60 seconds to form a conductive layer on the surface. The coated sample was then placed on the sample holder and taken into the device for images to be taken under a scanning electron microscope. Images were detected by the scattered electron detector (Figure 4).

Ethical approval:

This study was approved by Dicle University Animal Experiments Local Ethics Committee (Document number: 30/05/2022-294535)

Statistical analysis

The relationship between grouped variables was analyzed using an SPSS V16.0 for the chi-square test. $P < 0.05$ was considered statistically significant.

RESULTS

The prevalence of *T.vitulorum* in buffaloes by sex and age is given in Table 1. Positivity was detected in 5 (3.01%) of the 166 samples. Regarding prevalence by age groups, *T. vitulorum* was detected in 10% of the 0-6 month group, 4.17% of the 6-12 month group, and 0.89% of the older than 12 months group ($P > 0.05$). The prevalence by sex was determined as 3.85% for females and as 1.61% for males ($P > 0.05$).

Legends:

Table 1. Sex and age-wise prevalence of *T.vitulorum* in Anatolian Water Buffaloes

Figure 1. Map of the study area.

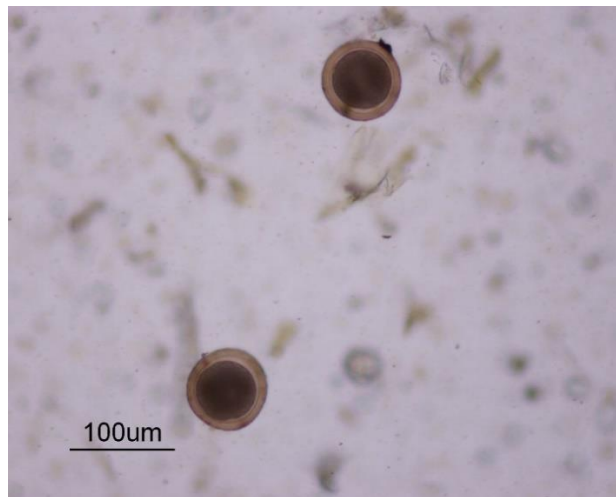
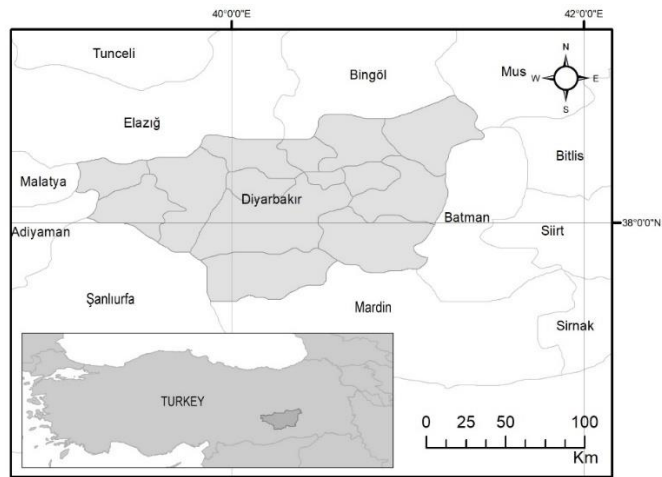
Figure 2. Anatolian Water Buffalo (*Bubalis bubalis*)

Figure 3. Light microscopy of *T. vitulorum* eggs.

Figure 4. Scanning electron micrographs of *T. vitulorum* eggs.

Table 1: Sex and age-wise prevalence of *T.vitulorum* in Anatolian Water Buffaloes.

Variable	Examined (n)	Positive		P
		(n)	(%)	
Sex				
Female	104	4	3.85	0.303
Male	62	1	1.61	
Age (month)				
1-6	30	3	10.00	0.955
6-12	24	1	4.17	
>12	112	1	0.89	
Total	166	5	3.01	



DISCUSSION

Toxocara vitulorum causes significant economic losses by causing high morbidity and mortality, especially in young buffalo calves under 3 months in tropical and subtropical countries with humid climates (Avcioglu and Balkaya, 2011; Parihar *et al.*, 2022).

The prevalence of the disease varies by region. In studies carried out in different parts of the world the ratios for prevalence were determined as follows: 7.3% in Iran (Tavassoli *et al.*, 2018), 16.6%-63.4% in Egypt (Starke-Buzetti *et al.*, 2001; Osmana *et al.*, 2016), 18.54-63.83% in Pakistan (Raza *et al.*, 2013; Deeba *et al.*, 2019), 2.4%–22.9% in Bangladesh (Mamun *et al.*, 2011; Biswas *et al.*, 2014; Biswas *et al.*, 2021), 8.47% in India 22.5% (Singh and Juyal, 2014; Parihar *et al.*, 2022), 25.5% in Lao (Rast *et al.*, 2013) and 20.1% in Cambodia (Dorny *et al.*, 2015).

Studies to determine the prevalence of *T. vitulorum* on buffaloes in Turkey are very limited. It has been reported that *T. vitulorum* was not found in Samsun in studies examining the digestive system of buffaloes (Çetindağ and Doğanay, 1996) and their milk (Gürler and Gürler, 2018), and in stool samples in Afyonkarahisar (Guzel and Kozan, 2013).

As a result of the present study, *T. vitulorum* was detected in 5 (3.01%) of 166 samples examined. While these results were similar to the findings of the study carried out by Mamun *et al.* (2011) and Biswas *et al.* (2014), they were still lower than the findings of other researchers (Starke-Buzetti *et al.*, 2001; Rast *et al.*, 2013; Raza *et al.*, 2013; Dorny *et al.*, 2015; Osmana *et al.*, 2016; Deeba *et al.*, 2019; Parihar *et al.*, 2022). Among the potential reasons for the difference seen between studies, geographic conditions, sample size, age of animals, sampling season, care and feeding conditions and methods used can be counted.

While some researchers (Raza *et al.*, 2013; Parihar *et al.*, 2022) detected a higher prevalence in females, Deeba *et al.* (2019) reported a higher prevalence in males. Similar to the findings of the researchers (Raza *et al.*, 2013; Parihar *et al.*, 2022) in this study, a higher prevalence was found in females than in males ($P>0.05$).

The higher incidence of infection in female buffalo calves may be due to the higher risk of infection through the udder, as females are allowed to suckle more often and frequently than males (Das and Phukan, 2018).

Studies show that the infection is more common in young buffalo calves compared to adult ones, and the prevalence is higher in buffalo calves aged 1-3 months (Starke-Buzetti *et al.*, 2001; Abdel-Rahman and El-Ashmawy, 2013; Raza *et al.*, 2013; Osmana *et al.*, 2016; Deeba *et al.*, 2019; Biswas *et al.*, 2021; Parihar *et al.*, 2022). In this study, age groups were divided into three groups, and the highest prevalence was found in the 1–6-month group, similar to the findings of the researchers ($P>0.05$).

The reason why the infection is more common in young animals may be due to transplacental transmission in the last stages of pregnancy, the passage of larvae to colostrum and milk and poor managerial conditions after birth (Parihar *et al.*, 2022).

CONCLUSION

As a result of this study, the presence of *T. vitulorum* in water buffaloes in Diyarbakır was revealed for the first time. It is stated that livestock raising, care, feeding, climate, and vegetation in unsuitable conditions play an important role in the spread of the parasite (Altinöz *et al.*, 2000; Aydin *et al.*, 2006). To determine the epidemiology of the disease in the region, it was concluded that larger herds should be studied and serological and molecular methods should be used to confirm and support the findings of microscopic methods.

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Conflicts of interest

There are no conflicts of interest

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