

# The Frequency of Parasites in Primary School Gardens in Ordu Province

Ülkü Karaman<sup>1</sup>, Özgür Enginyurt<sup>2</sup>, İpek Balıkçı Çiçek<sup>3</sup>,  
Gamze Yolalan<sup>4</sup>, Şermin Top<sup>5</sup>,  
Türkan Mutlu Yar<sup>6</sup>

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## ABSTRACT

**Aim:** In the study, it was thought that school gardens may carry a risk for the transmission of parasitic infections, and it was aimed to investigate the presence of parasites in soil samples in the gardens of primary schools in Ordu.

**Method:** The samples were taken from the gardens of 27 primary schools and 11 secondary schools in the city center of Ordu. Native-lugol and sedimentation methods were used for the diagnosis of parasites.

**Results:** From the samples taken from the gardens of the schools, parasites were detected in 21 (77.80%) of the primary school and 7 (63.60%) of the secondary school. Of these parasites, *Toxocara* spp. eggs were found at a rate of 16 (59.30%) in primary school and 2 (18.20%) in secondary school. Again, *Ascaris* spp. eggs were detected at a rate of 13 (48.10%) in primary school and 5 (45.50%) in secondary school. Live larvae were detected at a rate of 7 (25.90%) in primary school and 2 (18.20%) in secondary school.

**Conclusion:** In the study, it was concluded that parasite eggs can be found in school gardens and can infect children. In order to take the necessary precautions in this regard, suggestions were made that necessary training should be done on the ways of transmission and protection of parasites.

**Keywords:** Schoolyard, Ordu, helminth, protozoon

## Ordu İli İlköğretim Okul Bahçelerinde Parazitlerin Varlığı

### ÖZ

**Amaç:** Çalışmada okul bahçelerinin parazit enfeksiyonların bulaşması yönünden risk taşıyabileceği düşünülmüş olup Ordu ilindeki ilköğretim okullarının bahçelerindeki toprak örneklerinde parazitlerin varlığının araştırılması amaçlanmıştır.

**Yöntem:** Örnekler Ordu ili merkezinde topraklı alanları bulunan 27 ilköğretim okulu 11 orta öğretim okulunun bahçesinden alınmıştır. Parazit tanısı için nativ-lugol ve sedimantasyon yöntemleri kullanılmıştır.

**Bulgular:** Okulların bahçelerinden alınan örneklerden ilköğretim okullarının 21'inde (%77.8) orta öğretim okullarının 7'sinde (%63.60) parazit tespit edilmiştir. Bu parazitlerden *Toxocara* spp. yumurtası 16 ilköğretim okulunda (%59.30) ve 2 orta öğretim okulunda (%18.20) bulunmuştur. Yine *Ascaris* spp. yumurtası 13 ilköğretim okulunda (%48.10) ve 5 orta öğretim okulunda (%45.50) saptanmıştır. Canlı larvalar da 7 ilköğretim okulunda (%25.90) ve 2 orta öğretim okulunda (%18.20) gözlemlenmiştir.

**Sonuç:** Çalışmada okul bahçelerine parazit yumurtalarının bulunabileceği ve çocukları enfekte edebileceği sonucuna varılmıştır. Bu konuda gerekli tedbirlerin alınabilmesi için parazitlerin bulaşma ve korunma yolları ile ilgili gerekli eğitimlerin yapılması gerektiği önerileri sunulmuştur.

**Anahtar Kelimeler:** Okul bahçesi, Ordu, helmint, protozoon

<sup>1</sup> Faculty of Medicine, Ordu University, Ordu, Turkey, ORCID: 0000-0001-7027-1613, Corresponding Author

<sup>2</sup> Faculty of Medicine, Ordu University, Ordu, Turkey, ORCID: 0000-0002-5966-9126

<sup>3</sup> Faculty of Medicine, İnönü University, Malatya, Turkey, ORCID: 0000-0002-3805-9214

<sup>4</sup> Faculty of Medicine, Ordu University, Ordu, Turkey, ORCID: 0000-0002-3125-9379

<sup>5</sup> Faculty of Medicine, Ordu University, Ordu, Turkey, ORCID: 0000-0003-2684-7798

<sup>6</sup> Faculty of Medicine, İnönü University, Malatya, Turkey, ORCID: 0000-0002-7145-7476

## INTRODUCTION

Infections transmitted from animals to humans are called "zoonotic" diseases. It has been stated that the role of domestic animals in its spread is great (Bozkurt et al. 2012).

Cats and dogs are adapted animals well to human life. These animals cared for by various public and private organizations. Recently, it has been observed that many cats and dogs are left on the streets in underdeveloped or developing countries. It has been determined that there has been an increase in the number of stray animals for different reasons in Turkey in recent years (Avcıoğlu, 2007).

It has been observed that cats and dogs defecate in the sand or soil as an instinctive behavior. Sandboxes or playgrounds in parks are also places preferred by animals to defecate. It has been reported that children can become infected with these eggs, which are quite resistant to external conditions, by playing in the infected sandbox in parks (Divyamaol and Jeyathilakan, 2014).

In studies conducted on stray dogs in Turkey; It has been reported that helminth species such as cestodes, Taenia, Dipylidium, Mesocestoides, Echinococcus, Toxocara, Toxascaris, Ancylostoma, Uncinaria, Trichuris and Spirocerca from nematodes; are more common (Öge et al., 2017).

In the source information reached, no research was found on the presence of parasites in the gardens of primary schools in Ordu. In this study, it was aimed to investigate the presence of parasites in soil samples taken from the gardens of primary schools in Ordu. It considered that school gardens may carry a risk for the transmission of parasitic infections. In this respect, thought that the presented study will guide the literature in terms of detecting the presence of parasites, planning their treatment and prevention methods.

## MATERIALS AND METHODS

### Sampling size

The samples were taken from the gardens of 11 secondary schools in 27 primary schools, which have soil areas in the city center of Ordu.

### Collection of Samples

The pre-numbered nylon bags, shovels, methanol, gauze and gloves with samples taken from the gardens were placed in the bags. After each soil sample taken in turn, the shovel was wiped with methanol and gauze. Soil samples were taken from the determined areas at a depth of 3-8 cm, at least 250-300 grams, put into numbered nylon bags, tightly closed and brought to the laboratory. While taking the soil sample, care was taken not to collect stones with a diameter of 3-5 cm in order to ensure homogeneity.

### Methods Applied in Analysis of Samples

Soil samples was brought to the laboratory in nylon bags were sieved through a sieve into a deep and wide plastic container. The sieved soil samples were mixed again in the container and homogenized. The prepared soil samples were investigated directly with formol ether and Zinc-Sulphate.

**Direct View**

**Native:** A drop of physiological saline was placed on the slide. A piece of soil the size of a rice grain was taken by touching it in different parts of the soil with a mixer. Then a homogeneous mixture was obtained by placing it on the drop and crushing it. It was covered with a coverslip and examined under a microscope.

**Lugol:** The Lugolian review is prepared as in native. lugol is dripped instead of physiological saline.

**Formol ether precipitation method**

1. 1.5-2 g of soil sample and 10 ml of 10% formol (10 ml of stock formol solution + 90 ml of distilled water) were placed in a plastic container and mixed.

2. The mixture was left to stand for 30 minutes.

3. The soil was filtered with another coarse strainer.

4. The filtered soil was taken into a test tube and 3 ml of ether was added to it.

5. The mixture was shaken vigorously by closing the mouth of the test tube. The mouth of the tube was kept away from us while it was being opened. Because gas is formed in the tube due to agitation.

6. Tubes were centrifuged at 1100 rpm for 10 minutes.

8. The upper liquid was poured and a sample was placed on a drop of physiological saline and a drop on the lugol with the help of a pipette from the sediment at the bottom, covered with a coverslip and examined under a microscope.

**RESULTS**

In the study, samples were taken from the gardens of 27 primary schools and 11 secondary schools. Detected parasites are given in Tables 1 and Table 2.

**Table 1: Parasites detected in primary schools**

Study Schools	Detected Parasites
School 1	<i>Toxocara</i> spp. egg, <i>Ascaris</i> spp. egg.
School 2	<i>Toxocara</i> spp. egg, <i>Ascaris</i> spp. egg, larva
School 3	<i>Toxocara</i> spp. egg, <i>Ascaris</i> spp. egg, larva
School 4	<i>Toxocara</i> spp. egg, <i>Ascaris</i> spp. egg,
School 5	<i>Toxocara</i> spp. egg
School 6	<i>Toxocara</i> spp. egg, larva
School 7	<i>Toxocara</i> spp. egg, larva
School 8	<i>Toxocara</i> spp. egg, <i>Ascaris</i> spp. egg, larva
School 9	<i>Ascaris</i> spp. egg
School 10	<i>Toxocara</i> spp. egg, <i>Ascaris</i> spp. egg
School 11	<i>Toxocara</i> spp. egg, <i>Ascaris</i> spp. egg
School 12	<i>Ascaris</i> spp. egg
School 13	<i>Toxocara</i> spp. egg
School 14	<i>Toxocara</i> spp. egg, <i>Ascaris</i> spp. egg
School 15	<i>Toxocara</i> spp. egg, <i>Ascaris</i> spp. egg
School 16	<i>Ascaris</i> spp. egg
School 17	Larva
School 18	<i>Toxocara</i> spp. egg

School 19	-
School 20	-
School 21	<i>Ascaris</i> spp. egg
School 22	-
School 23	-
School 24	-
School 25	<i>Toxocara</i> spp. egg, larva -
School 26	-
School 27	<i>Toxocara</i> spp. egg

As seen in the Table 1, *Toxocara* and *Ascaris* eggs were seen and unidentified larvae were detected.

**Table 2: Parasites Detected in Secondary Schools**

Study Schools	Detected Parasites
School 1	<i>Crenosoma vulpis</i> , <i>Toxocara</i> spp. egg
School 2	<i>Ascaris</i> spp. egg
School 3	<i>Ascaris</i> spp. egg, larva
School 4	<i>Ascaris</i> spp. egg
School 5	-
School 6	-
School 7	-
School 8	<i>Ascaris</i> spp. egg
School 9	<i>Toxocara</i> spp. egg
School 10	-
School 11	<i>Ascaris</i> spp. egg

As seen in the tables, two species were observed as *Toxocara*, *Ascaris* eggs and unidentified larvae were detected. No protozoa were found in the samples taken.

Presence/absence categories of parasites detected with primary and secondary schools, *Toxocara* spp. presence/absence of eggs, *Ascaris* spp. There was no statistically significant correlation between presence of egg and presence of Larvae categories ( $p < 0.05$ ) (Table 3).

**Table 3. Relationship table according to presence/absence of parasites detected according to group categories**

Variables	Categories of variables	Group				p value
		Primary school		Secondary school		
		N	%	N	%	
Detected Parasites	Presence	21	77.80	7	63.60	0.432**
	None	6	22.20	4	36.40	
<i>Toxocara</i> spp. egg	Presence	16	59.30	2	18.20	0.052*
	None	11	40.70	9	81.80	
<i>Ascaris</i> spp. egg	Presence	13	48.10	5	45.50	1.0*
	None	14	51.90	6	54.50	
Presence/absence of larva	Presence	7	25.90	2	18.20	1.0**
	None	20	74.10	10	81.80	

\*: Yatesin corrected chi-square test, \*\*: Fisher exact chi-square test

From the samples taken from the gardens of the schools, parasites were detected in 21 (77.80%) of the primary school and 7 (63.60%) of the secondary school. Of these parasites, *Toxocara* spp. egg parasite 16 (59.30%) in primary school and 2 (18.20%) in secondary school, *Ascaris* spp. Egg parasite was found in 13 (48.10%) primary school and 5 (45.50%) in secondary school, and Larva parasite 7 (25.90%) in primary school and 2 (18.20%) in secondary school.

In 9 of the samples collected from primary schools, *Toxocara* spp. egg parasite and *Ascaris* spp. egg parasite is present together. These two parasites were not found together in samples collected from secondary schools. In 6 of the samples taken from primary schools, *Toxocara* spp. Egg parasite and larval parasite were found together. It was detected in only 1 of the samples taken from secondary schools. In 3 of the samples taken from primary schools, *Ascaris* spp. egg parasite and larval parasite coexist. It is found only in 1 of the samples taken from secondary schools. In addition, these three parasite species were seen at the same time in 3 primary schools at the same time. These three types of parasites have not been seen simultaneously in secondary schools.

## DISCUSSION AND CONCLUSION

It has been observed that cats and dogs defecate in the sand or soil as an instinctive behavior. Sandboxes or playgrounds in parks are also places preferred by animals to defecate. In this direction, samples were collected from school gardens in the study and parasites were found in 77.8% of them.

Different studies have been conducted on the prevalence of parasites in playgrounds, sandboxes in parks and public areas. Raicevic et al (2021) detected parasites in 81.6% of the samples they collected from kindergarten gardens and parks in May. These are *Ancylostomatidae* spp 113 (40.1%), *Toxocara canis* 82 (29.1%), *Dipylidium caninum* 76 (27.0%), *Giardia intestinalis* 45 (16.0%), *Taenia* spp. in 44 (15.6%), *Amoeba* spp. 32 (11.3%) *Trichuris vulpis* 19 (6.7%), *Toxascaris leonina* 18 (6.4%), *Strongyloides stercoralis* 17 (6.0%), *Isospora* spp. 7 (2.5%) and *Cryptosporidium* spp. stop at 3 (1.1%). They reported that they encountered less number of parasites in the samples they took in October. In the present study, no parasites other than helminths were encountered. This may be attributed to the number of samples taken and the method of examination. Samples were taken from school gardens only in October. The low number of parasites may have been caused by this. Again, similar to the data obtained in the study, *Toxocara* spp. (17.17%), *Trichuris* spp. (8.88%), *Strongyloides* spp. and *Toxascaris* spp. reported as.

In the study; Soil samples were taken from the designated areas at a depth of 3-8 cm, at least 250-300 grams. They were placed in numbered nylon bags, tightly closed and brought to the laboratory. In similar studies, Toparlak et al. (2002), 300 grams at 10 cm depth, Avcioğlu (2007), 250-300 grams at 10 cm depth, Nooraldeen (2015), 20 grams at 3-7 cm depth, Tudor (2015), 30 grams, Bortolatto et al. (2017) detected parasites in 100 grams of soil samples from a depth of 10 cm, and Divyamol and

Jeyathilakan (2014) in 50 grams of soil samples from a depth of 5 cm. In the present study, parasite eggs and larvae were detected in the collected samples.

In studies carried out in parks in Turkey, Öge and Öge (2000), in Ankara, *Toxocara* spp., *Ancylostoma* spp., *Taenia* spp., *T. leonina*, *Trichuris* spp., *Enterobius vermicularis* eggs. Sengür and Oner (2005), in Istanbul, nematode larva, *Acanthamoeba* spp., *Entamoeba coli*, *Entamoeba histolytica*, *Toxocara* spp., *Dipylidium caninum*, *Dicrocoelium* spp., *Ascaris* spp. Aydenizöz Ozkayhan (2006), in Kırıkkale, *Toxocara* spp., *Toxascaris leonina*, *Taenia* spp. and *Isospora* spp. Avcioğlu (2007), in Ankara, *Toxocara* spp., *T. leonina* and *Taenia* spp., *Isospora* spp. and *Eimeria* spp oocysts. Avcioğlu and Balkaya (2011), Erzurum, *Toxocara* spp. and *Taenia* spp. eggs. Bozkurt et al. (2012), in Kayseri, *Toxocara cati*, *Toxocara canis*, *Toxocara leonina*, *Taenia* spp., *Spirocerca lupi*, *Echinococcus* spp. and *Ancylostoma caninum* have detected. In the source information reached, no study was found in the school gardens.

In the study, it was determined that there were stray animals in the school gardens. It was determined that the parasites obtained in this situation were also normal. No parasites were found in all soil samples. In this case, samples were not collected at regular intervals. Samples were collected only in September. It was thought that more parasites would have been encountered had they been collected at different times.

In the study, suggestions were made to raise the awareness of the students in terms of the presence of parasites, to explain the importance of hygiene rules and to prevent the entry of stray animals into the school gardens.

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