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RESEARCH ARTICLE

Prevalence of helminths in horses raised in Konya Province

Uğur Uslu[1]*, Osman Güngör[2]

[1]University of Selcuk, Faculty of Veterinary Medicine, Department of Parasitology, Konya, Turkey
[2]University of Veterinary Medicine, Clinical Unit of Equine Internal Medicine, Vienna, Austria
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* uuslu@selcuk.edu.tr

Konya bölgesinde atlarda bulunan helmintlerin prevalansı

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Öz

Amaç: Bu araştırma, Konya yöresinde yetiştirilen atlarda helmint türlerinin prevalansını belirlemek amacıyla yapılmıştır.

Gereç ve Yöntem: Rastgele seçilen beş çiftlikte farklı yaş, cinsiyet ve ırktaki 100 yetişkin at dışkı bakılarına göre incelenmiştir. Taze dışkı örnekleri 2016 Şubat ve Mart aylarında toplanıp, Flotasyon, Benedek sedimantasyon ve Baermann Wetzel tekniği ile incelenmiştir. Strongylid yumurtalar teşhis edildikten sonra dışkı kültürü yapılmıştır.

Bulgular: Yumurtaların toplam prevalansı Cyathostomin'ler için % 49, *Parascaris equorum* için %12 ve *Oxyuris equi* için %2 oranlarında bulunmuştur. Beş at çiftliğinde en az bir at Strongylid yumurtası çıkarırken, sırasıyla ikinci ve dördüncü çiftlikte *P. equorum* ve *O. equi* yumurtaları atlar tarafından çıkarılmıştır. Strongylid yumurtalar ile enfekte örneklerden toplanan larvalar morfolojik olarak teşhis edilmiştir. *Trichonema* sp., *Poteriostomum sp., Strongylus vulgaris, Strongylus edentatus ve Triodontophorus sp*. larvaları sırasıyla %49, %17, %3, %3 ve % 1 oranlarında bulunmuştur. *Strongylus equinus* larvası tespit edilememiştir.

Öneri: Beş çiftliğin herbirindeki atlar *Trichonema* sp. ve *Poteriostomum sp*. ile enfekte idi. *S. vulgaris* yumurtaları iki çiftlikte bulunurken, *S. edentatus* ve *Triodontophorus sp.* yumurtaları sadece bir çiftliğin atlarında görülmüştür. Trematod, cestod yu-murtaları ve *Dictyocaulus arnaieldi* larvaları tespit edilmemiştir. Küçük strongylidler ve çok az sayıda büyük strongylidler atların mide bağırsak helmint enfeksiyonlarına sebep olan temel parazitlerdir.

Anahtar kelimeler: At, helmintler, endoparazit, yaygınlık

Abstract

Aim: This study was carried out to estimate the prevalence of helminth species in horses raised in Konya region of Turkey.

Materials and Methods: One hundred adult horses of varying age, gender and breed from five randomly chosen farms were sampled. Fresh fecal samples were taken between February and March 2016 and examined by flotation, Benedek's Sedimentation and Baermann Wetzel technique and, strongylid eggs were detected, and then subsequent larval culture was performed.

Results: The overall prevalences of egg excretion were 49% for Cyatostomins, 12% for *Parascaris equorum* and 2% for *Oxyuris equi*. On all five farms, at least one horse shed strongylid eggs, while *P. equorum* and *O. equi* eggs were excreted by horses from four and two farms, respectively. Harvested larvae from samples with strongylid eggs were subsequently differentiated morphologically. Larvae of *Trichonema sp., Poteriostomum sp., S. vulgaris, S. edentatus and Triodontophorus sp.* were found with overall prevalence of 49%, 17%, 3%, 3% and 1%, respectively. Larvae of *Strongylus equinus* were not found.

Conclusion: On each of the five farms horses were infected with *Trichonema sp.* and *Poteriostomum sp. S. vulgaris* eggs were excreted by horses of two farms, while infections with *S. edentatus or Triodontophorus sp*. were only seen in horses on one farm. Neither trematode nor cestode eggs nor larvae of *Dictyocaulus arnaieldi* could be detected. Small strongyles and to a much lesser extent large strongyles are the main gastro intestinal helminthic infections of horses in Konya region.

Keywords: Horse, helminth, endoparasites, prevalence

Introduction

Infections with gastrointestinal (GI) parasites can cause severe health problems. Although the prevalence of large strongyle infections appears to be reduced in many countries by anthelminthic treatment strategies; however, small strongyle infections have not effectively been controlled by modern anthelmintics (Hinney et al 2011). A brief tabulated summary of the prevalence of GI parasites during the last 25 years in horses of many countries, given by Hinney et al (2011), shows that most well- known species of the past are still prevalent at significant numbers. The prevalence of the various gastro-intestinal helminthic parasites has not been documented from Konya, a semi-arid region of Anatolia, Turkey. Previous studies in other regions of Turkey showed fecal egg excretion of GI nematodes by 30-100% of the sampled horses (Demir et al 1995, Arslan and Umur 1998, Piskin et al 1999, Gul et al 2003, Bakırcı et al 2004, Aydenizoz 2004, Uslu and Guclu 2007, Kozan and Guzel 2015). Amongst other factors, climate conditions affect the external parasite development and consequently alter infection pressure and rates in equines. Since the majority of studies on equine helminth parasites have been performed in more humid regions of the world, this descriptive qualitative study was designed to provide basic data for more comprehensive studies on the prevalence of equine GI helminths kept on farms in Konya and their clinical impact in Turkey.

Table 1. Characteristics of study horses from five farms of Konya, Turkey

Gender	
Male	82[a]
Female	18[b]
Breeds	
Ambling	74[a]
Arabian horse	12[b]
English horse	8[bc]
Mini pony	3[c]
Belgium draft horse	1[d]
Haflinger	2[c]
Age	
Median age (and range)	8 (2-29)
Young horse (<2 years)	2

[a,b,c]: Different letters in the same column are statistically significant (P<0.05)

Materials and methods

Collection of fecal samples

Between February and March 2016, fresh fecal samples were collected from of all horses (n=100) at that time present on five different farms around the city of Konya. Individual fecal samples were collected from the rectum of all horses, put into a labeled plastic bag and kept at 0-5°C till further processing.

Fecal examination

Eggs were harvested using Fülleborn's saturated salt solution for flotation and by Benedek's sedimentation method; larvae were collected by the Baermann-Wetzel method (Forety 2001). All samples that contained eggs of Strongylidae were cultured and kept at 25°C for two weeks and L3 were harvested for differentiation as described using morphological keys (MAFF 1986, Georgi and Georgi 1990, Von Samson-Himmelstjerna 2006).

Data analysis

Descriptive statistics was used to analyze the data.

Results

In table I, the characteristics of the sampled population are given. The majority of animals were mature male Ambling horses, a local breed famous for its pacing speed. Only two 2-year old horses were sampled. In total, 53% of the samp-

Table 2. On-farm prevalence of helminths in horses of Konya, Turkey

	Prevalence on farm level	Prevalence on horse level
Helminth species	(n=5)	(n=100)
Cyathostominae sp.	100%	49[a] %
Strongylus vulgaris	40%	3[c] %
Strongylus equinus	40%	3[c] %
Triodontophorus sp.	20%	1[c] %
Parascaris equorum	80%	12[b] %
Oxyuris equi	20%	2[c] %

[a,b,c]: Different letters in the same column are statistically significant (P<0.05)

Table 3. Single and mixed helminth infection in horses of Konya, Turkey

Cyathostomins only	35[a]
Cyathostomins and large strongyles	6[bc]
Cyathostomins plus ascarids	8[b]
Large strongyles plus ascarids	1[c]
Ascarids	3[bc]

[a,b,c]: Different letters in the same column are statistically significant (P<0.05)

led horses shed helminth eggs, but none shed trematode or cestode eggs. Furthermore, larvae of D. arnfieldi were not de-tected. Results of shedding are given in Table 2. A part of the horses was shedding eggs of more than one helminth gro-ups. Strongylid larvae were cultured from all strongyle egg excreting animals and belonged to the following genera or species in descending order of prevalence: *Trichonema* sp. (49%), *Poteriostomum sp.* (17%), *S. vulgaris* (3%), *S. edentatus* (3%) and *Triodontophorus sp*. (1%). Infection with cyathostomins (*Trichonema* sp. only or in combination with *Poteriostomum sp.*) was present on all five farms, whereas *S. vulgaris* was excreted by at least one horse in two farms. *S. edentatus* ,*Triodontophorus sp.* and *O. equi* on one farm. *P. equorum* infection was present on four out of five farms. The prevalence of single or multiple nematode species infections was further analyzed and results given in Table 3. A small majority of the horses were infected with only species belonging to only one nematode family.

Discussion

Farms had histories of unstructured deworming policy. Last treatment with ivermectin on 2 farms was 1 year before the sampling and on 3 farms even 2 years before. Since all horses of the farms had been sampled at the start of the spring, it is likely at least a part of the possibly inhibited larvae had matured and produced eggs. Some of the effective methods for controlling horse strongylids may depend on the type of farm, farm management, the age of horses and breeds (Kuzmina and Kharchenko 2008, Lyons et al 2011).

Table 4. Ages, breeds and gender of the study horses

	Male horses		Female horses		Total	
Ages	Number of Animals	Total	Number of Ani-	Total	Number of	Total
	According to Breeds	22	mals	2	Animals	24
1-5	18 Ambling,	46	According to	11	According to	57
6-10	2 Arabian,	11	Breeds	3	Breeds	14
11-15	2 Ponies	3	2 Ambling	2	20 Ambling,	5
16-20	38 Ambling	82	8 Ambling,	18	2 Arabian,	100
Total	2 English		1 English		2 Ponies	
	6 Arabian		2 Arabian		51 Ambling,	
	6 Ambling,		1 Ambling,		3 English	
	2 English		1 English		3 Arabian	
	2 Arabian		1 Haflinger		7 Ambling,	
	1 Haflinger				3 English	
	1 Ambling,		2 English		2 Arabian	
	1 Belgian				2 Haflinger	
	1 Ponies		11 Ambling,		2 English	
	63 Ambling,		2 Arabian		1 Ambling,	
	10 Arabian		4 English		1 Belgian	
	4 English		1Haflinger		1 Ponies	
	3 Ponies				74 Ambling,	
	1Haflinger				12 Arabian	
	1 Belgian				8 English	
					3 Ponies	
					2Haflinger	
					1 Belgian	

Cyathostomin infection was present on each farm. However, the contamination effect of hedding horse in the pasture was not determined because the egg could not be done. The impact of the shedding horse on pasture contamination, could not be established since quantification of strongyle eggs counts was not carried out. Since all horses appeared clinically healthy, it is likely that the levels of parasitic infections created immunity rather than overt pathology. Compared to other Turkish studies (Ozer and Kuçukerdan 1992, Arslan and Umur 1998, Piskin et al 1999, Esatgil and Efil 2012, Gul et al 2003, Altas et al 2005, Umur and Acıcı 2005, Uslu and Guclu 2007, Kozan and Guzel 2015), the overall helminth infection rates were lower in our study. This could have been attributable to the maturity and immune status of the equine population as well as due to unfavorable environmental conditions for egg hatching and survival of L3 larvae.

In this study, 4 two-years-old and 6 horses aged between 5 and 11 years shedded *P. equorum* eggs, which agrees with the findings of Mirck (1978) showing that *P. equorum* infections are not exclusively found in young horses. *P. equorum* egg shedding rate in the current study was 12% which is higher than for mature horses in Brandenburg (Hinney et al 2011). The relevance of *P. equorum* infections is recently discussed regarding resistance against cyclic lactones (Hearn and Pergrine 2003, Slocombe et al 2007, Reinemeyer 2009, Andersen et al 2013). Eggs of *P. equorum* are extremely resistant and can survive for long times in different biotopes, this and ineffective deworming policy may guarantee permanent ascarid infection pressure on farms. Since new evidence exists that adult horses appear to be more often infected than previously suggested, the better anti-ascarid strategy must be applied. The limited clinical consequence of ascarid infection of adults as reported by Clayton (1982) needs to be revaluated too. Generally, prevalence of *P. equorum* infestations in Turkey is estimated to vary between 0.5 and 33% (Piskin et al 1999, Gul et al 2003, Aydenizoz 2004, Bakirci et al 2004, Altas et al 2005, Karaca et al 2005, Uslu ve Guclu 2007, Umur ve Acıcı 2009, Esatgil ve Efil 2012, Kozan and Guzel 2015). In studies of different countries 6 - 22% of the horses excreted *P. equorum* eggs (Mirck 1978, Beelitz and Gothe 1997, Rehbein et al 2013, Tolossa and Ashenafi 2013, Sheferaw and Alemu 2015), whereby the prevalence of excreting foals is at the upper range (Lyons and Tolliver 2004).

Generally, the prevalence *O. equi* is relatively lower and varies between 0.7- 2% (Mirck 1978, Epe et al 1993, Tolossa and Ashenafi 2013, Sheferaw and Alemu 2015). In Turkey, the prevalence appears slightly higher (Piskin et al 1999, Gul et al 2003, Oge 2004, Uslu ve Guclu 2007, Esatgil ve Efil 2012). In this study *O. equi* was found in the feces of only two animals, however, if sellotape samples from the perianal region had been taken, the incidence might have been higher (Oge 2004), therefore this figure does not represent the actual prevalence of *O. equi* in Konya.

Infection with the major large strongylid species *S. vulgaris* and *S. edentatus* were found, but *S. equinus* appears absent. The prevalence of *S. vulgaris* in Turkey varies from 3 to 62 % and of *S. edentatus* ranges from 5 to 52% (Gulbahce 1990, Akkaya et al 1998, Gul et al 2003, Altas et al 2005, Umur and Acici 2005, Esatgil and Efil 2012, Kozan and Guzel 2015) in our study, egg shedding of both large strongyles was at the low ends of the range. The prevalence of *Triodontophorus sp.* in Turkey varies between 1-23% (Aydenizoz 2004, Umur and Acıici 2005, Esatgil and Efil 2012, Kozan and Guzel 2015), and in our study, it was also at the low end of the range. The low prevalence of large strongyle egg excretion may be caused by sufficient immunity, effective deworming strategy for larges strongyles or due to a low uptake of L3 caused by poor survival conditions in summer and autumn on pastures of Konya.

The reported prevalence of *Poteriostomum sp.* ranges from 2 to 13 % in Turkey (Aydenizoz 2004, Altas et al 2005, Kozan and Guzel 2015) and of *Trichonema* sp. is 30-77 % (Gulbahce 1990, Arslan and Umur 1998, Altas et al 2005, Uslu and Guc-lu 2007, Kozan and Guzel 2015).

The overall prevalence of *Poteriostomum sp.* was 17%; whereas, that of *Trichonema* sp. in the current study was 49%. It seems that especially *Trichonema* sp appears successful survivor under management conditions in Konya.

Conclusion

The excretion of eggs in early spring suggests the enteric presence of mature small strongyles. This could be caused by the parasite`s choice for an alternative hypobiotic period, as was suggested to occur in feral horses grazing in the Danube delta after a very dry summer. Further studies are needed to test this hypothesis.

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References

Akkaya H, Horoz H, Vuruşaner C, 1998. Strongylus spp. ve *Parascaris equorum* ile invaze yarış atlarının (safkan İngiliz) Febantel (Rintal®) ile tedavisi ve strongylus larvalarının oranlarının tespiti. Türkiye Parazitol Derg, 22, 303-307.

Altas MG, Gokcen A, Sevgili M, Ozkutlu Z, 2005. Şanlıurfa yöresindeki safkan arap atlarında helmintolojik araştırmalar. 14th National Congress of Parasitol, Abstr Book, 18-25 Eylül, İzmir, Turkey, p. 214.

Andersen UV, Howe DK, Olsen SN, Nielsen MK, 2013. Recent advances in diagnosing pathogenic equine gastrointestinal helminths: The challenge of prepatent detection. Vet Parasitol,192, 1–9.

Arslan MO, Umur S, 1998. The helminth and Eimeria (Protozoa) species in horse and donkey in Kars. Acta Parasitol Turcica, 22, 180-184.

Aydenizoz M, 2004. The prevalence of helminths in horses in Kirikkale, Turkey. Indian Vet J, 81, 255-258.

Bakirci S, Cirak VY, Gulegen E, Karabacak A, 2004. Parasites found by fecal examinations in horses in the Gemlik Military Stud Farm. Acta Parasitol Turcica, 28, 35-37.

Beelitz P, Gobel E, Gothe R, 1996. Endoparasites of donkeys and horses kept in Upper Bavaria; species spectrum and incidence. Tieraztl Prax, 24, 471-475.

Clayton HM, 1982. The pathogenesis of equine ascariasis. Proc Am Ass Vet Parasit, 2. 1978.

Demir S, Tınar R, Aydın L, Çırak VY, Ergül R, 1995. Prevalence of helminth species according to faecal examination in equids in Bursa. Acta Parasitol Turcica, 19, 124-131.

Epe C, Ising-Volmer S, Stoye M, 1993. Parasitological faecal studies of equids, dogs, cats, and hedgehogs during the years 1984-1991. Dtsch Tierarztl Wochenschr, 100, 426-428.

Esatgil MU, Efil II, 2012. A coprological study of helminth infections of horses in Istanbul, Turkey. Kafkas Univ Vet Fak Derg 18 (Suppl-A), A1-A6.

Forety WJ, 2001. Veterinary Parasitology. Reference Manual, 5th ed, Iowa State University Press. USA.

Georgi JR, Georgi ME, 1990. Parasitology for Veterinarians. 5th ed. WB Saunders Company, London, pp: 140-381.

Gul A, Deger S, Ayaz E, 2003. The prevalence of helminth species according to faecal examination in equids in different cities in Turkey. Turk J Vet Anim Sci, 27, 195-199.

Gulbahce S, 1990. Epidemiology of parasites found in equids in province Konya. Selcuk Univ., Hight Lisans Thesis. Health Science Institute, Konya.

Hearn FP, Pergrine AS, 2003. Identification of foals infected with *Parascaris equorum* apparently resistant to ivermectin. J Am Vet Med Assoc, 223, 482-485.

Hinney B, Nicole Wirtherle NC, Kyule M, Miethe N, Zessin KH, Clausen PH, 2011. Prevalence of helminths in horses in the state of Brandenburg, Germany. Parasitol Res, 108:1083–1091

Karaca M, Ayaz E, Tutuncu M, Gul A, Akkan HA, 2005. Van yöresi atlarında helmint enfeksiyonlarının yayılışı ve bazı kan parametreleri. Yüzüncü Yıl Üniv Vet Fak Derg, 16, 71-74.

Kozan E, Guzel H, 2015. Helminths found by faecal examination in the equine in Afyonkarahisar Region. Kocatepe Vet J, 8, 18-21.

Kuzmina TA, Kharchenko VO, 2008. Anthelmintic resistance in cyathostomins of brood horses in Ukraine and influence of anthelmintic treatments on Strongylid community structure. Vet Parasitol, 154, 277-288.

Lyons ET, Tolliver SC, 2004. Prevalence of parasite eggs (*Strongyloides westeri*, *Parascaris equorum*, and strongyles) and oocysts (*Eimeria leuckarti*) in the faeces of Thorough bred foals on 14 farms in central Kentucky in 2003. Parasitol Res, 92, 400-408.

Lyons ET, Kuzmina TA, Tolliver SC, Collins SS, 2011. Observations on development of natural infection and species composition of small strongyles in young equids in Kentucky. Parasitol Res, 109, 1529–1535

MAFF, 1986. Technical Bulletin No. 18, Manuel of Veterinary Parasitological Laboratory Techniques, London. Her Majesty's Stationary Office, London, UK.

Mirck MH, 1978. Studying the faeces for the presence of parasites in horses and ponies. Tijdschr Diergeneeskd, 103, 991-997.

Oge H, 2004. Dışkı bakılarına göre atlarda helmint enfeksiyonlarının genel durumu. Doktora Tezi, Ankara Üniv. Sağlık Bil. Enst. Ankara, 1991. Cited in Bakırcı S., V.Y. Çırak, E. Ozer E, Küçükerden N, 1992. Helminth and Eimeria sp. found in equids in Elazığ and region. Doğa Tr J vet Anim Sci, 17, 217-221.

Piskin FÇ, Biyiklioglu G, Babur C, Kanat MA, Ozcengiz E, 1999. Helminth infections in the horses used for serum production according to faecal examination. Acta Parasitol Turcica, 23, 436-439.

Rehbein S, Visser M, Winter R, 2013. Prevalence, intensity and seasonality of gastrointestinal parasites in abattoir horses in Germany. Parasitol Res, 112, 407-413.

Reinemeyer CR, 2009. Diagnosis and control of anthelmintic-resistant *Parascaris equorum*. Parasit Vectors, 2 Suppl 2: S8.

Sheferaw D, Alemu M, 2015. Epidemiological study of gastrointestinal helminths of equines in Damot-Gale district, Wolaita zone, Ethiopia. J Parasit Dis, 39, 315–320.

Slocombe JO, de Gannes RV, Lake MC, 2007. Macrocyclic lactone-resistant *Parascaris equorum* on stud farm in Canada effectiveness of fenbendazole and pyrantel pamoate. Vet Parasitol, 145, 371-376.

Tolossa YH, Ashenafi H, 2013. Epidomiological study on gastrointestinal helminths of horses in Arsi-Bale highlands of Oromiya Region, Ethiopia. Ethiop Vet J, 17, 51-62.

Umur S, Acici M, 2005. Orta Karadeniz Bölgesi tek tırnaklılarında helmint enfeksiyonlarının dağılımı. 14th National Congress of Parasitol, Abstr Book, 18-25 Eylül, İzmir, Turkey, pp. 140-141.

Umur S, Acici M, 2009. A survey on helminth infections of equines in the Central Black Sea region, Turkey. Turk J Vet Anim Sci, 33, 373- 378.

Uslu U, Guclu F, 2007. Prevalence of endoparasites in horses and donkeys in Turkey. Bull Vet Ins Pulawy, 51, 237-240.

Von Samson-Himmelstjerna G, 2006. Helminthosen der Equiden. Schnieder T. Ed. Veterinärmedizinische Parasitologie. Paul Parey Verlag, Berlin, 303-346.