



RESEARCH ARTICLE

The prevalence of helminth infections in water buffaloes in the vicinity of Afyonkarahisar province

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Özet

Guzel H, Kozan E. Afyonkarahisar civarı mandalarında bulunan helmintlerin yayılışı. **Eurasian J Vet Sci, 2013, 29, 3, 126-132**

Amaç: Bu çalışma Afyonkarahisar civarı mandalarında helmint enfeksiyonlarının durumunun belirlenmesi amacıyla yapıldı.

Gereç ve Yöntem: Toplam 517 mandadan alınan dışkı örnekleri helmintolojik açıdan incelendi, 20 mandanın organ muayenesi yapıldı ve helmintolojik açıdan değerlendirildi.

Bulgular: Çalışma süresince dışkı bakışı yapılan mandalarda enfeksiyon oranı %7.93 tespit edildi. Hastalıktan sorumlu 2 trematod ve 1 nematod olduğu gözlemlendi, ancak miks enfeksiyona rastlanmadı. Mandalarda trematod ve nematod enfeksiyonu sırasıyla %6.67 ve %1.16 olarak belirlenirken, sestod enfeksiyonuna rastlanmadı. Diğer yandan organ muayenesi yapılan mandalarda enfeksiyon oranının %20 olduğu tespit edildi. Hastalıktan sorumlu türlerin 2 trematod ve 1 sestod olduğu görüldü.

Öneriler: Genel olarak enfeksiyon oranları düşük olmakla birlikte çeşitli helmint parazitlerin mandalarda enfeksiyona neden olduğu gözlenmiştir. Enfeksiyon oranının düşük olmasının hayvan refahı ve çiftlik yönetimi konusunda bilincin artmasının yanı sıra yörede çiftlik hayvanlarına yönelik yoğun antelmintik kullanımından kaynaklanabileceği kanaatine varılmıştır.

Anahtar kelimeler: Manda, helmint, Afyonkarahisar, Türkiye

Abstract

Guzel H, Kozan E. The prevalence of helminth infections in water buffaloes in the vicinity of Afyonkarahisar province. **Eurasian J Vet Sci, 2013, 29, 3, 126-132**

Aim: This study was conducted to determine the prevalence of helminth infections in water buffaloes raised in the vicinity of Afyonkarahisar province.

Material and Methods: Faecal samples, collected from a total of 517 buffaloes, were examined helminthologically. Furthermore, organ examination was performed in 20 water buffaloes for the presence of helminths.

Results: The prevalence of helminth infection in the water buffaloes sampled for faeces throughout the study was determined as 7.93%. Faecal examination revealed the presence of 2 trematodes and 1 nematode in the infected cases, but mixed helminth infections were not encountered. In water buffaloes, the prevalence of trematode and nematode infections was ascertained as 6.67% and 1.16%, respectively, whilst no cestode infection was detected. On the other hand, the prevalence of helminth infection in the water buffaloes subjected to organ examination was ascertained as 20%. The parasitic agents involved in the infected cases included 2 trematodes and the larval stage of 1 cestode.

Conclusions: In general, it was observed that the rate of infection was low, yet animals were infected with various helminth species. The infection rates of the animals being low was attributed to the increased level of awareness of the farmers on animal welfare and farm management, as well as to the high level of use of anthelmintics in the region against common parasites of cattle and water buffaloes.

Keywords: Water buffalo, helminth, Afyonkarahisar, Turkey





Introduction

Amongst livestock, water buffaloes have particular economic significance across the world with respect to their use as a food animal raised for milk and meat production as well as for draught power. Buffaloes are bred at varying levels in almost 40 countries, located in the tropical and subtropical zones of the Asian continent (Southeast Asia), South America, North Africa, the Mediterranean excluding France, the Balkans, also including certain Central European countries and Australia (Nanda and Nakao 2003, Anonymous 2012).

In Turkey, buffaloes are bred in Samsun and Sinop provinces situated along the northern coast of Anatolia, in Tokat, Corum and Amasya provinces in Central Anatolia, in Afyonkarahisar and Balikesir provinces in Central-west Anatolia, in Sivas and Mus provinces in East Anatolia and in Diyarbakir province in Southeast Anatolia (Atasever and Erdem 2008).

To date, the helminth fauna of water buffaloes raised in Afyonkarahisar province and its vicinity has not been investigated. In this respect, the present study was aimed at determining the helminth infections of water buffaloes raised in the region with a view to determine the local fauna and to contribute to the development of protection and control strategies for helminth infections.

Materials and Methods

This study was conducted between March-2009 and February-2012 in the Akcin, Kucukcobanli, Kadikoy and Koprulu villages and central district of Afyon province, all which are characterized by a high population of water buffaloes. Faecal samples were collected from a total of 517 buffaloes, 138 of which were aged 1-3 years and 379 of which were aged 4 years and above. Furthermore, organ examination was performed in 20 water buffaloes for the presence of helminths. The distribution of the animals included in the study for age, sex and origin is presented in Table 1. In addition to faecal examination, the entire organs and tissues of 20 animals, including 14 that were aged 1-3 years and 6 that were aged 4 years and above, all which were slaughtered at the slaughterhouse were examined for the presence of helminth infections.

The faecal samples were examined using the sedimentation, flotation techniques and the Baermann-Wetzel method (Thienpont et al 1986). For the identification of gastrointestinal nematodes at least at the genus level, faecal cultures were prepared (Soulsby 1982). The larvae recovered from the faecal cultures were identified at the genus level in accordance

with relevant literature reports (Soulsby 1982, Hansen and Perry 1990). During the study period, the local slaughterhouses where buffalo slaughter was performed were visited and the entire organs and tissues of the slaughtered animals were examined separately for the presence of helminths.

The statistical analysis of the results obtained in the study was made with the chi-square test and using the SPSS software package. $P < 0.05$ was accepted at significance level.

Results

Faecal examination revealed that 41 (7.93%) of the animals were infected with different helminthic parasites. The parasitic infections were caused by 2 trematodes and 1 cestode, but mixed infections were not encountered. The prevalence and the distribution of helminth infections for the age and sex of the animals sampled are shown in Table 2. The prevalence of helminth infection was determined as 15.2% in the buffaloes aged 1-3 years and as 5.3% in the buffaloes aged 4 years, and the difference between the age groups was found to be statistically significant ($p < 0.001$). 13.3% of the male buffaloes and 7% of the female buffaloes were found to be infected, yet, no statistically significant difference was determined to exist for sex ($p = 0.061$). Faecal examination revealed that the prevalence of trematode and nematode infections were 6.67% and 1.16%, respectively, in water buffaloes raised in Afyonkarahisar province and its vicinity, while cestode infections were not encountered.

The number of eggs per gram faeces in the faecal samples determined to contain strongylid eggs was minimum 25 and maximum 150. Faecal cultures were prepared to enable the identification of parasite species at least at the genus level. Accordingly, the presence of the genera *Trichostrongylus*, *Oesophagostomum*, *Haemonchus*, *Bunostomum* and *Cooperia* was confirmed. The percentile distribution of the genera of parasites determined in the faecal samples is given in Figure 1.

Throughout the study period, local slaughterhouses performing buffalo slaughter were visited, and the organs and tissues

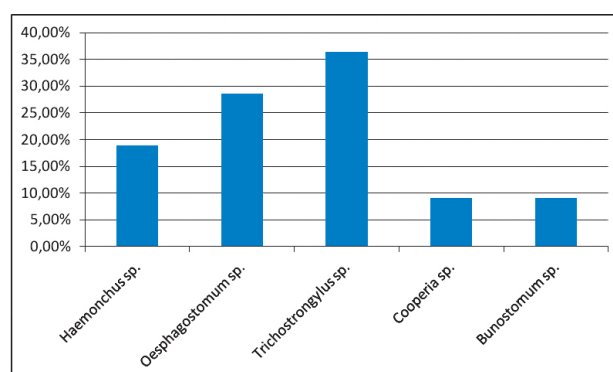


Figure 1. The percentile distribution of the genera of parasites determined in the faecal samples.



Table 1. The distribution for age, sex and origin of buffaloes sampled for faeces.

Origin	1-3		≥4		Total
	♂	♀	♂	♀	
Akcin	13	23	1	111	148
Kuçukcobanlı	28	44	5	166	243
Kadikoy	-	-	-	20	20
Koprulu	14	-	1	-	15
Center	9	7	4	71	91
Total	64	74	11	368	517

Table 2. Distribution for age and sex and percentages of helminth infections based on faecal examination results.

Helminth	1-3		≥4		%
	♂	♀	♂	♀	
<i>Fasciola sp.</i>	7	10	2	15	6.57
<i>Paramphistomatidae sp1</i>	-	-	-	-	0.19
<i>Strongylida sp.</i>	-	3	-	3	1.16

Table 3. The distribution of the helminths, including larval forms, determined by organ examination for age and sex.

Helminth	1-3		≥4		%
	♂	♀	♂	♀	
<i>Fasciola hepatica</i>	1	-	-	-	5
<i>Paramphistomatidae sp.</i>	1	-	-	-	5
<i>Cyst hydatid</i>	-	-	1	1	10

of 20 buffaloes, 4 of which were female and 16 were male, were examined helminthologically. Accordingly, 4 (20%) of the buffaloes were determined to be infected. The parasitic infections were ascertained to be caused by 2 trematodes and the larval form of one cestode species. The distribution of the helminths, including the larval form, for age and sex, is presented in Table 3. The examination of the internal organs of the slaughtered buffaloes revealed the prevalence of trematode and cestode infections both as 10%, whilst nematode infections were not observed. Of the buffaloes aged 1-3 years, 14.3%, and of the buffaloes aged 4 years and above, 33.3% were infected, whilst of the male buffaloes 18.8% and of the female buffaloes 25% were found to have helminth infection. The differences for age ($p=0.329$) and sex ($p=0.780$) were statistically insignificant.

Two (10%) of the buffaloes examined presented with cystic echinococcosis in both the lungs and the liver. While the male buffalo presented with fertile cysts containing protoscoleces, the female buffalo presented with sterile cysts that contained no protoscoleces.

Only one (5%) of the buffaloes examined presented with *Paramphistomatidae sp.* nested in between the rumen papillae, yet the young forms of the parasite were not observed in the duodenum.

Again, only one (5%) of the buffaloes was determined to be infected with *Fasciola hepatica*, based on the examination of biliary duct sections.

Discussion

Buffaloes bear economic significance for the dairy and meat industries in Afyonkarahisar province. However, only very few studies have been conducted on the helminth infections of water buffaloes, and to date, no such investigation had been carried out in Afyonkarahisar province.

Owing to differences in management conditions and physiological features, fewer helminth infections are observed in water buffaloes in comparison to cattle (Du et al 1995). In the present study, the number of helminths and the prevalence of helminth infections determined in water buffaloes were lower than those reported in cattle (Sevimli et al 2005, Sevimli et al 2007). Similar to previous studies conducted in cattle, a smaller number of helminth species and a lower prevalence of helminth infections having been detected in the present study.

The prevalence of helminth infections in sampled buffaloes has been reported as 15.2% by Akhter et al (2001), 47% by Bhutto et al (2002), 40% by Athar et al (2011) and 13% by Wadhwa et al (2011). In an investigation conducted in water buffaloes raised in Samsun province and its vicinity, 39% of the buffaloes were determined to be infected with helminths (Cetindag and Doganay 1996). In the present study, the prevalence of helminth infections in the water buffaloes sampled was determined as 7.93%, which is lower than that reported in previously conducted studies.

Although the distribution of trematodes, cestodes and nematodes varies between the different regions of a country as well as between different countries, according to faecal examination results, nematodes rank first in helminth infections and are followed by trematodes and cestodes, respectively (Akhter et al 2001, Bhutto et al 2002, Mamatha and Placid 2006, Wadhwa et al 2011). The percentages of trematode and nematode infections in buffaloes were reported as 5.4% and 9.2%, respectively, by Akhter et al (2001) and 4% and 43%, respectively, by Bhutto et al (2002), while Wadhwa et al (2011) reported to have observed only strongylid eggs in 13% of the faeces samples examined. Cestode infections were not encountered in any of the above mentioned research. Cetindag and Doganay (1996) reported to have detected 1 trematode and 12 nematode species, and to have not encountered any cestodes in water buffaloes raised in Samsun province and its vicinity. The results obtained in the present study display similarity to those reported in the above mentioned studies conducted in Turkey and other countries. On the other hand, the prevalence determined for nematode infections in this study is lower than that reported in previous research.

The difference observed in the rates of infection of the different age groups was attributed to the immunity the adult animals had developed over time against infections. Akhter et al





(2000) reported that age is important in the distribution of helminth infections and that the rate of infection in animals younger than the age of 3 is higher. Furthermore, Cetindag and Doganay (1996) determined that, of the water buffaloes sampled for faeces, those aged 0-3 years displayed an infection rate of 55.55% while those aged 4 years and above presented with an infection rate of 25.45%. In this respect, the results obtained in the present study were in agreement with the previous reports.

The assessment made for sex demonstrated that 13.3% of the male buffaloes and 7% of the female buffaloes were infected. The infection rates of male and female animals were reported as 36.9% and 11%, respectively, by Akhter et al (2000) and 45.12% and 48.30%, respectively, by Bhutto et al (2002). The results obtained in the present study are similar to those reported by Akhter et al (2000), but differ from those reported by Bhutto et al (2002).

The prevalence of *Fasciola sp.* was ascertained as 24% in water buffaloes raised in Samsun province and its vicinity (Cetindag and Doganay 1996). Research conducted in Egypt (Shalaby 1997, Hussein and Khalifa 2010) demonstrated the prevalence of fasciolosis to range between 11.5 -33.7%, while in Pakistan (Akhter et al 2001, Bhutto et al 2002) the prevalence of *F. gigantica* was determined as 3.2-4% and the prevalence of *F. hepatica* was ascertained as 2.2%. Furthermore, the prevalence of *F. hepatica* has been reported as 7.1% in Italy (Rinaldi et al 2009), the prevalence of *F. gigantica* as 18.9% in Bangladesh (Islam et al 1992), and the prevalence of *F. hepatica* as 28.5% in Argentina (Racioppi et al 2007). In the present study, 6.57% of the buffaloes sampled for faeces were found to be infected with *Fasciola sp.* While this percentage was in agreement with some research (Rinaldi et al 2009), it differed from some other research (Islam et al 1992, Cetindag and Doganay 1996, Shalaby 1997, Akhter et al 2001, Bhutto et al 2002, Racioppi et al 2007, Hussein and Khalifa 2010). This difference is considered to may have arisen from local differences.

Research conducted on the distribution of paramphistomiasis in water buffaloes by means of faecal examination revealed the prevalence of the disease to be 29.5% in Bangladesh (Islam et al 1992). The prevalence of *P. cervi* was ascertained as 0.8% in Pakistan (Akhter et al 2001) and as 29.24% in Bangladesh (Al Mamun 2008), whilst in Italy the prevalence of *C. daubneyi* was determined as 7.1% (Rinaldi et al 2009). Faecal examination results demonstrated that the prevalence of paramphistomiasis in water buffaloes raised in Samsun province and its vicinity in Turkey was 22% (Cetindag and Doganay 1996). The paramphistomiasis prevalence of 0.19% detected in the present study is lower than that reported in the above mentioned research.

Various studies carried out in different countries present variable information on the distribution of gastrointestinal

strongylosis in water buffaloes. In Philippines (Van Aken et al 2000), the prevalence of gastrointestinal strongylosis was 28%, while the prevalence was reported as 33.1% in Italy (Rinaldi et al 2009) and 13% in India (Wadhwa et al 2011). Furthermore, the prevalence of trichostrongylosis in water buffaloes raised in the vicinity of Samsun province was determined as 12% (Cetindag and Doganay 1996). The rate of infection detected in the present study is lower than that reported in previously conducted studies. This difference is attributed to environmental differences as well as to the high level of anthelmintic use in Afyonkarahisar province and its vicinity.

The most common genus was *Trichostrongylus* (36.36%) followed by *Oesophagostomum* (27.27%), *Haemonchus* (18.18%), *Cooperia* (9.09%) and *Bunostomum* (9.09%). Van Aken et al (2000) reported the presence of *Mecistocirrus sp.* (33%), *Cooperia sp.* (29%) and *Haemonchus sp.* (26%) in the cultures prepared from buffalo faeces samples. The genera identified in the present study display similarity to those reported by Van Aken et al (2000).

Little research has been conducted in Turkey on the investigation of helminth infections in water buffaloes by organ examination (Guralp and Dogru 1968, Guralp and Oguz 1970, Ozer 1987, Cetindag 1993, Sarimehmetoglu et al 1993, Umur and Gicik 1995, Cetindag and Doganay 1996, Kircali 2004, Beyhan and Umur 2011). In the present study, which is the first conducted in Afyonkarahisar province, of the 20 buffaloes for which organ examination was performed, 4 (20%) were determined to have helminth infection. Organ examination in water buffaloes revealed the prevalence of *F. hepatica* and *F. gigantica* as 44.7% and 24.9%, respectively, in China (Liu et al 2008), and as 11.47% and 13.52%, respectively, in Pakistan (Kakar and Kakarsulemankhel 2008), whilst in India 1.5% of the buffaloes examined were found to be infected with *Fasciola sp.* (Mamatha and Placid 2006). The prevalence of fasciolosis in water buffaloes in Iraq was reported as 4% (Kadir and Rasheed 2008). In the present study, 5% of the water buffaloes, in which the liver was examined, were ascertained to be infected with *F. hepatica*. The result obtained for the prevalence of fasciolosis displays similarity to that reported by Kadir and Rasheed (2008). Several researches have been conducted in other countries on the prevalence of paramphistomiasis in water buffaloes. Based on organ examination, the prevalence of the disease was determined as 48.3% in Bangladesh (Islam et al 1992), whilst the prevalence of *P. explanatum* was reported as 5.58% in Pakistan (Kakar and Kakarsulemankhel 2008), and the prevalence of *P. cervi* was reported as 4.3% in China (Liu et al 2008). Furthermore, the prevalence of *C. daubneyi* in water buffaloes raised in the vicinity of Samsun province in Turkey was indicated as 31% (Cetindag and Doganay 1996), while the prevalence of paramphistomiasis in water buffaloes raised in Bolu province in Turkey was determined as 66.6% (Guralp 1981). In the present study, 5% of the buffaloes of those organ examina-





tion performed were, ascertained to be infected with Paramphistomatidae sp.

Results of organ examination demonstrated the prevalence of *Oesophagostomum radiatum* as 41.6%, *Haemonchus contortus* as 25.5%, and *Trichostrongylus axei* as 21.6% in water buffaloes in Bangladesh (Islam et al 1992), and the prevalence of *H. contortus* as 61.8% in China (Liu et al 2008). The presence of *H. placei*, *Cooperia* sp. and *O. radiatum* was reported in Australia (Bryan et al 1976). The examination of the organs of the digestive system of 100 water buffaloes for the presence of helminths in the vicinity of Samsun province in Turkey demonstrated the presence of parasitic nematodes. Nematodes were not observed during the examination of the large intestines of water buffaloes slaughtered at the Kazan Slaughterhouse in Ankara province in Turkey (Kircali 2004). Similarly, in the present study, no nematodes were observed in any of the water buffaloes for which organ examination was performed. This result was in agreement with the report of Kircali (2004).

Cystic echinococcosis is a major parasitic disease that causes significant economic losses resulting from damage to multiple organs, including, primarily the liver. There are very few studies conducted on the distribution of cystic echinococcosis in water buffaloes (Islam et al 1992, Rahman et al 1992, Capuano et al 2006, Cringoli et al 2006, Singh et al 2006, Daryani et al 2007, Beyhan and Umur 2011). The prevalence of cystic echinococcosis in water buffaloes was reported as 24.4% in Bangladesh by Islam et al (1992), as 10.5% in Italy by Capuano et al (2006), as 24.61% in India by Singh et al (2006) and as 21.98% in Iran by Nayeb and Meshkehkar (2010). Cystic echinococcosis was not encountered in research conducted in water buffaloes in Egypt (Rahman et al 1992). On the other hand, investigations conducted in Samsun, Ordu and Amasya provinces in Turkey demonstrated a prevalence of 10.24% of cystic echinococcosis in water buffaloes (Beyhan and Umur 2011). In the present study, 10% of the water buffaloes examined were infected with cystic echinococcosis and this result was in agreement with the report of Beyhan and Umur (2011).

It is reported that cystic echinococcosis is more common in adult water buffaloes, compared to young animals. In the Black Sea region of Turkey, the prevalence of cystic echinococcosis has been reported as 39.93% in water buffaloes above the age of 3 years and as 4.38% in water buffaloes younger than 3 years of age (Beyhan and Umur 2011). The results of the present study are in support of those reported by Beyhan and Umur (2011).

In a study conducted by Turkmen (1992) in Istanbul province in Turkey, 20.14% of the male buffaloes and 90.91% of the female buffaloes examined presented with cystic echino-

coccosis, whilst in the Black Sea region, 3.77% of the male buffaloes and 21.66% of the female buffaloes examined were reported to have cystic echinococcosis by Beyhan and Umur (2011). In the present study, a higher rate of infection with cystic echinococcosis is having been observed in females compared to males was in agreement with the reports of Turkmen (1992) and Beyhan and Umur (2011). Similarly, Daryani et al (2007) reported a higher rate of infection in female animals in Iran, but indicated this difference to be statistically insignificant. In this respect, the present study is in agreement with the previous study conducted by Daryani et al (2007).

Islam et al (1992), Capuano et al (2006), Cringoli et al (2006), Singh et al (2006), and Beyhan and Umur (2011) have reported to have detected cystic echinococcosis in the liver and lungs of water buffaloes. Similarly, in the present study, unilocular cysts were observed in both the liver and the lungs of the water buffaloes infected with cystic echinococcosis.

Conclusions

The present study conducted in Afyonkarahisar province and its vicinity demonstrates, for the first time, the current situation of helminth infections in the water buffalo population of the region. In general, it was observed that the rate of infection was low, yet animals were infected with various helminth species. The infection rates of the animals being low was attributed to the increased level of awareness of the farmers on animal welfare and farm management, as well as to the high level of use of anthelmintics in the region against common parasites of cattle and water buffaloes.

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