

## A Survey of Gastrointestinal Nematodes of Donkeys (*Equus asinus*) in Khartoum State, Sudan

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**Abstract:** In a field survey 1200 donkeys from Khartoum State during a complete year (one hundred animals per month) were examined parasitically for the presence of helminthes parasites by assessment of faecal eggs and culture identification of larvae. Generally 70.1% of the examined animals harbored a parasitological infection. Six nematode genera were encountered in donkeys, among them *Dictyocaulus arnfieldi* (70.5%) reported for the first time in Sudanese donkeys. *Strongylus* sp. (35.8%), *Cyathostomes* (36.7%), *Parascaris equorum* (10.7%), *Trichostrongylus axei* (12%), and *Strongyloide westeri* (3.4%). The incidence of infection with one species (53.2%) was found higher than that of mixed infection (46.7%). According to severity of infection, 58.6% of the infected animals showed mild infection, while 21.9% and 19.5% of them showed moderate and severe infection, respectively. In the current study, cold season encouraged higher incidence of gastrointestinal nematodes (72.5%), more so than hot (69.3%) and rainy seasons (68.5%). Other results obtained, showed that hot season revealed higher mean EPG count ( $1198.7 \pm 558.3$ ) ranging from 100 to 17700, followed by the rainy season with mean egg ( $961.21 \pm 120.3$ ) ranging from 100-13500, and cold season with mean egg ( $888.6 \pm 297.5$ ) ranging from 100 – 13300.

**Key words:** Donkeys, gastrointestinal nematodes, epidemiology, Sudan

### Introduction

In Sudan, as in many other developing countries, donkeys play an important role in the provision of energy for agricultural production by way of traction for cultivation and transport of produce, goods and labor. More attention has thus far been paid to horses than to donkeys. Often it is presumed, without any scientific verification that the epidemiology of donkey parasites will be similar to that in horses (Pandey, 1980). In the Sudan, surprisingly very little work has been done on the parasites of donkeys, only few publications show prevalence of several internal parasites of donkeys (Kheir and Kheir, 1981). Listing the species present in equines in Sudan (Eisa *et al.*, 1979), and other studies are limited to the occurrence of certain specific internal parasites in donkeys, e.g. *Onchocerca* (Fadia, 2000).

General information on diseases and health problems in equines is rare but even more conspicuous is the complete absence of research and studies on problems related to the donkeys (Mohamed *et al.*, 2000).

Sudan possesses about 6.350.000 donkeys (SBAR, 2000). In view of this large population of donkeys in Sudan, coupled with their socioeconomic importance and the lack of information concerning prevalence of gastrointestinal nematodes of donkeys, the present study was undertaken to provide further information on the incidence, severity, and seasonal prevalence of infection with gastrointestinal nematodes over a consecutive 12- month period.

### Materials and Methods

This study was conducted in Khartoum state, which is located in the semi arid zone, centre of the Sudan.

**Samples Collection and Examination:** One thousand and two hundred donkey fresh faecal samples were collected and submitted to the diagnostic laboratory of the department of Medicine Pharmacology & Toxicology, Faculty of Veterinary Medicine, University of Khartoum. Sudan. Egg counts were carried using modified McMaster technique (MAF, 1986) and the eggs were identified according to Thienpont *et al.* (1985). The percentage of infestation and differential egg counts for nematodes were determined.

**Time Schedule:** A total of 100 faecal samples were collected monthly for a whole year (January 2003 to December 2003). Months from March to June were considered as hot season, and July to October as rainy season, and November to February as cold season.

**Intensity of Infection:** The severity of infection as obtained from the number of eggs per gram of faeces was determined according to Soulsby (1982) as follows:

500 eggs/gram of faeces = Mild infection  
 800 – 1000 eggs/gram of faeces = *Moderate infection*  
 1500 – 2000 eggs/ gram of faeces = Severe infection.

## Results and Discussion

The seasonal prevalence of gastrointestinal nematodes encountered during this study, intensity of infection, type of infection mean egg counts, and differential egg counts and percentage of infection are presented in Tables (1-5). All examined donkeys were male pack donkeys belonging to the Nubian Ass (*Equus africanus africanus*). From Table 1, the overall prevalence was 70.1%. This level of parasitic infection is generally higher than that recorded by Kheir and Kheir (1981) who reported 56.2% at Nyala town and 24% in Bahr El Arab, where they studied the prevalence gastrointestinal nematodes. This may be attributed to the large number of animals examined in this study compared to the small number of animals examined in Nyala town (215) and Bahr El Arab (120). The seasonal prevalence of gastrointestinal nematodes from table (1) revealed that gastrointestinal parasites were more prevalent in cold season (72.5%) than hot (69.3%), and rainy season (68.5%). Kheir and Kheir, (1981), stated that infection with helminthes parasites was noticed to be higher at the beginning of the rainy season (July – August). The relationship between high nematode infestation and winter months may be related to suitable temperature of winter season (22-26°C) and humidity (85-100%) favoring survival and hatching of nematode eggs.

From Table 2, 58.6% of the examined animals harbored mild infection, where as 21.9% and 19.5% of the animals harbored moderate and severe infection, respectively. This lowered egg production was further seen in case of multiple infection with three nematode species (Kheir and Kheir, 1981) in donkeys, where the egg counts fell to 100, 200, and 300 eggs per gram of faeces as compared with the corresponding counts in case of single infection. Although most of egg counts recorded in this study were more than 300 eggs per gram of faeces for mixed infection, yet no clinical signs were noticed in these animals. Kheir and Kheir, (1981), attributed this to the age of animals under investigation (4-10 years), that they might have acquired old age resistance against helminthes parasites.

From Table 3, it is more worthy to observe that the incidence of infection with single nematode species (53.3%) was higher than with multiple infections (46.7%), although this is in agreement with the findings of Kheir and Kheir, (1981), who reported higher incidence of infection with single nematode species (74.9%) and (24.6%) with multiple infection.

From Table 4 the mean egg count was  $(1016.6 \pm 363.6)$ . The rainy season recorded higher epg  $(1198.75 \pm 558.3)$ , compared to cold  $(961.1 \pm 120.3)$  and hot  $(888.6 \pm 297.5)$ . These findings are in agreement with that of Kheir and Kheir, (1981).

From Table 5, *Dictyocaulus arnfieldi* is recorded for the first time with high incidence of (70.5%). In Morocco Pandey (1980) reported 48% and in Ethiopia Feseha *et al.*, (1991) reported 83% incidence of *Dictyocaulus arnfieldi*. The incidence of *Strongylus spp.* in this study (35.8%) is in agreement with the findings of Kheir and Kheir (1981) at Nyala town (41.3%), and at Bahr El Arab (31%), where in Chad Graber (1970) reported 89%, and in Kenya Mukhwana (1994) reported 57.6%, in Ethiopia Feseha *et al.*, (1991) reported 100% prevalence. In this study *Cyathostomes* represented (36.7%) of the parasites identified. In Morocco Abdelkarim (1991) reported 52%, in Chad Graber (1970), reported 89% and in Kenya Mukhwana (1994) reported 15.4%, where in Ethiopia Feseha *et al.*, (1991) reported 100%. *Parascaris equorum* recorded (10.7%), while Kheir and Kheir (1981) reported (6.6%) in Nyala and (6.8%) at Bahr El Arab. In Kenya 20.7% , in Ethiopia 33%, in Chad 72%, in Morocco 37% was

Table 1: Prevalence of gastrointestinal nematodes in donkeys per season (No. = 400 animal / season)

Season	No. of +ve animals	% per season (out of 400 animal)	% of total (out of 1200 animal)
Hot	277	69.3	32.94
Rainy	274	68.5	32.58
Cold	290	72.5	34.48

Table 2: Severity of infestation with gastrointestinal nematodes in donkeys per season (No. = 400 animal / season)

Severity Season	Mild		Moderate		Severe	
	No. of +ve	%	No. of +ve	%	No. of +ve	%
Hot	161	58.2	58	20.9	58	20.9
Rainy	156	56.9	66	24.1	52	19.0
Cold	176	60.7	60	20.7	54	18.6
Total	493	58.6	184	21.9	164	19.5

Table 3: Type of gastrointestinal nematode infestation in donkeys per season (No. = 400 animal / season).

Type Season	Mixed		Single	
	No. of +ve	%	No. of +ve	%
Hot	124	44.8	153	55.2
Rainy	137	50	137	50
Cold	132	45.5	158	54.5
Total	393	46.7	448	53.3

Table 4: Range and mean  $\pm$  SD of egg per gram of faeces (EPG) count in donkeys infested with gastrointestinal nematodes per season (No. = 400 animal / season).

Season	Mean $\pm$ SD	Range
Hot	1198.8 $\pm$ 558.3	100-17700
Rainy	961.1 $\pm$ 120.3	100-13500
Cold	888.6 $\pm$ 297.5	100-13300
Total	1016.6 $\pm$ 363.6	100-17700

Table 5: Incidence percent of helminthes in donkeys per season (No. = 400 animal / season)

Season	+ve %	Dictyo.	Syus.	Cyatho.	Psca.	Tricho.	Sdes.
Hot	69.3% (277)	79.8% (221)	23.8% (66)	25.6% (71)	11.6% (32)	14.4 (40)	7.6% (21)
Rainy	68.5% (274)	76.6% (210)	46.7% (128)	31% (85)	12.4% (34)	4.7% (13)	1.8% (5)
Cold	72.5% (290)	55.9% (162)	36.9% (107)	52.8% (153)	8.3% (24)	16.6% (48)	1% (3)
Total	70.5% (841)	70.5% (593)	35.8% (301)	36.7% (309)	10.7% (900)	12% (101)	3.4% (29)

Dictyo = Dictyocaulus arnfieldi

Syus = Strongylus spp.

Cyatho = Cyathostomes

Psca. = Parascaris equorum

Tricho = Trichostrongylus axei

Sdes = Strongyloides westeri

reported by Mukhwana (1994), Feseha *et al.*, (1991), Graber (1970), Abdelkarim (1991) respectively. *Trichostrongylus axei* (12%), in Ethiopia 100% Feseha *et al.*, (1991), in Morocco 93.5% Pandey *et al.*, (1992). *Strongyloides westeri* (3.4%), while Kheir and Kheir (1981), reported (4.1%) at Nyala and (6.8%) at Bahr El Arab. In Morocco Abdelkarim (1991), reported 1% and in Chad Graber (1970) reported 6%.

In general, in Sudan, very little attention has been paid to the parasites of donkeys. However, in view of the presence of large numbers of several species of helminthes in the same animal, it is highly likely these parasites might exert pathological effects on the donkeys. The animals are further subjected to the stress of poor nutrition and hard work, especially during the peaks of agricultural operations (Pandey *et al.*, 1992). It is therefore, advisable to treat them with anthelmintics. At least two treatments the first at summer (March –April) and second in late Autumn/early winter (October – December) would be required to keep the worm burden at a low level. An additional treatment in July might be useful.

### Acknowledgement

This study was made possible by a research grant from the German Academic Exchange Services (DAAD). The staff members of the department of Medicine, Pharmacology and Toxicology, Faculty of Veterinary Medicine, University of Khartoum are also thanked for their valuable assistance.

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