



Prevalence, Severity and Predisposing Factors of Gastrointestinal Parasite Infection in Polo Horses in Ibadan, Nigeria

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ABSTRACT

Helminthic infections are one of the most common problems that horses encounter, and they frequently result in poor body condition, which limits their work potential and efficiency. The present study was designed to investigate the prevalence, severity and predisposing factors (age, sex and breed) of gastrointestinal parasites of polo horses in Ibadan, Oyo state. Faecal samples were collected from a total of 56 polo horses in Ibadan. The samples were analysed for the presence of gastrointestinal parasites (GIPs) using sodium chloride flotation technique. Parasites were identified using standard method and faecal egg count was estimated using the modified McMaster technique. The egg per gram (EPG) of infected horses was classified as light (50-799 eggs), moderate (800-1200 eggs), and severe (over 1200 eggs). Information on age, sex and breed were documented to establish their association with faecal egg count. An overall prevalence of 92.9% GIPs was observed. Four GIPs comprising of three nematodes which are *Strongylus* spp, *Strongyloides* spp and *Parascaris equorum* and one protozoan *Eimeria* spp was seen. *Strongylus* spp (89.3.1%) and *Strongyloides* spp (3.6%) occurred as single infection while a mixed infection of *Strongylus* spp with *Parascaris equorum* (1.8%); *Strongylus* spp with *Strongyloides* spp (1.8%), and *Strongylus* spp (1.8%) with *Eimeria* spp were also seen. There was no association between the prevalence/EPG and age, sex and breed of horses. However, there was higher occurrence and severe infection in adults, females and exotic breeds of horses. There is high prevalence of severe gastrointestinal parasite infection in polo horses in Ibadan which often occurred in some instances as mixed infections. There is need for improved veterinary care, investigation of the efficacy of available anthelmintics and susceptibility of parasites for improved horse health and optimal performance.

Keywords: Gastrointestinal parasite, Mixed infection, Nigeria, Polo horses.

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The horse (*Equus caballus*) plays a vital role to man in a variety of ways, including agriculture, pleasure riding, polo, ceremonies, police service, crowd control, entertainment, and research (Umar *et al.*, 2013; Ola-Fadunsin *et al.*, 2018; Idoko *et al.*, 2021). Parasites are one of the most common problems limiting the health and performance of donkeys and horses around the world (Mezgebu *et al.*, 2013). Horses are susceptible to various gastrointestinal parasites such as *Strongylus* spp, *Parascaris equorum*, *Oxyuris equi*, *Dictyocaulus arnfieldi*, *Anoplocephala perfoliata*, *Strongyloides* spp, *Fasciola* spp, *Anoplocephala* spp, *Gasterophilus* spp, *Trichostrongylus axei* and *Eimeria* spp (Ananzi and Alyousif, 2011; Berhanu *et al.*, 2014; Ola-Fadunsin *et al.*, 2019), leading to varying degrees of damage

depending on the species and number present, as well as the nutritional and immune status of the equids (Asefa *et al.*, 2011).

The most prevalent GIPs is *Strongylus* spp and the species that have been associated to equine infections include *Strongylus edentatus*, *Strongylus vulgaris*, and *Strongylus equinus* (Bulgaru and Tudor, 2016; Ola-Fadunsin *et al.*, 2019). When horses consume larvae in contaminated forage by faeces, they become infected. The larvae become active in the intestine once inside the horse and migrate widely via blood vessels and other organs before maturing in the large intestine (Saeed *et al.*, 2019). These parasites are capable of causing serious disorders such as diarrhea, emaciation, colic, anaemia, hemorrhage, poor

performance, weight loss and even death (Ananzi and Alyousif, 2011; Kompi et al., 2021). Host risk factors such as sex, age, body condition, physiological status, parasitic factors like intensity and species of worm population and environmental factors like weather condition and animal husbandry practices are crucial at the development of gastrointestinal parasites infections (Kompi et al., 2021).

Equestrian activities such as Polo are currently gaining popularity in Nigeria and polo stables have the highest population of horses, especially in southwestern Nigeria. Considering the need for maximal performance of the polo horses at play, there is need for constant health monitoring. There is documented evidence on the occurrence of gastrointestinal parasite infections in horses from some parts of Nigeria (Ola-Fadunsin et al., 2019; Eze et al., 2019).

However, there is paucity of information on the status in southwestern Nigeria. This study was designed to investigate the prevalence, severity and predisposing factors (age, sex and breed) of gastrointestinal parasites of polo horses in Ibadan.

MATERIALS AND METHODS

Study Area

This study was carried out in Ibadan located in southwestern Nigeria in the southeastern part of Oyo state, at latitude 7° 23' 47" North and longitude 3° 55' 0" East. Ibadan is the capital city of Oyo state located on seven hills (average elevation 700 feet) about 100 miles (160km) from the Atlantic coast. It has a tropical wet (March- October) and dry (November-February) seasons. The mean daily temperature is 26.46°C.

Sample collection:

About 3gms of faecal samples were collected from the rectum of 56 polo horses, comprising of different breeds (49 exotic, 7 local), sex (15 male, 41 female) and ages (6 young, 46 adult, 4 old) using protective disposable gloves into clean and dry universal bottles. They were transported to the diagnostic parasitology laboratory section of the Department of Veterinary Parasitology, University of Ibadan for processing. Horses were fed with fresh grasses (hand cut) and concentrates with water given ad libitum. The study animals had received anthelmintic treatment two months prior to the period of study.

Laboratory Techniques

Coproscopical examination was done for the presence of helminth eggs and/or protozoan oocysts by sedimentation and saturated salt flotation techniques as described by Foreyt (2001). Identification of parasitic eggs and oocysts was carried out as described by Kassai (1999) and Zajac and Conboy (2012). Eggs and oocysts were also counted using the modified McMaster technique, as described by Hansen and Perry, (1990). The EPG of infected horses was classified as light (50-799 eggs), moderate (800-1200 eggs), and severe (over 1200 eggs) according to (Egbe-Nwiya et al., 2019).

Statistical Analysis

The data obtained were subjected to descriptive statistics. Prevalence of GIPs was expressed as percentages. Chi-square (Univariable model) test was used to determine the associations of potential predisposing factors with the presence of GIPs using the Statistical Package for the Social Sciences (SPSS) software version 22.0 for Windows (SPSS, Chicago, IL, USA) at 95% confidence. Results were presented in tables.

RESULTS

Four GIPs comprising of three nematodes which are *Strongylus* spp (Fig. 1A), *Strongyloides* spp (Fig. 1B) and *Parascaris equorum* and one protozoan *Eimeria* spp was observed. Out of a total 56 faecal samples examined, overall prevalence of gastrointestinal parasites was 92.9% (nematodes-91.1% and nematodes with protozoa- 1.8%) GIPs was observed as shown in Table 1. The prevalence of nematodes in relation to breed, sex and age of horses are shown in Table 2.

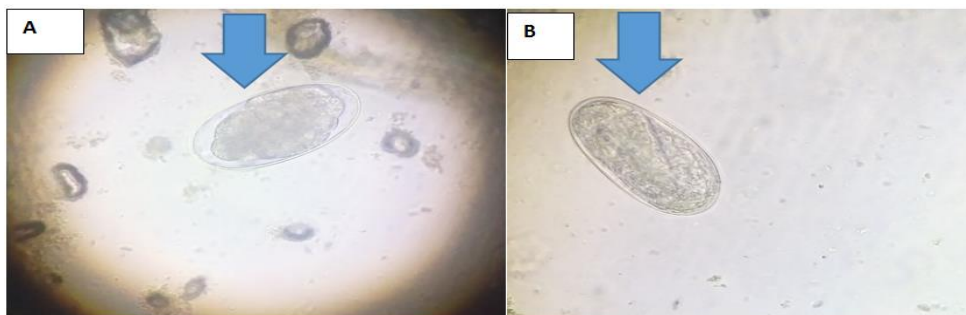


Fig 1: Eggs of GIPs (A) *Strongylus* spp (B) *Strongyloides* spp. Magnification: X40

Table 1: The overall prevalence of gastrointestinal parasites of polo horses.

Parasites	No of Sample examined	No of Sample Positive	Prevalence (%)
Nematodes	56	51	91.1
Nematode&Protozoa	56	1	1.8

Table 2. Prevalence of Nematodes and Protozoa in relation to predisposing factors of horses:

Variable	No of Sample examined (n=56)	No of Sample positive	Prevalence (%)	Chi square Value
Breed				
Nematodes				0.744
Local	7	7	12.5	
Exotic	49	44	78.6	
Protozoa				
Local	7	1	1.8	
Exotic	49	-	-	
Sex				
Nematodes				0.702
Male	15	14	25.0	
Female	41	37	66.1	
Protozoa				
Male	15	1	1.8	
Female	41	-	-	
Age				
Nematodes				0.455
Young	6	6	10.7	
Adult	46	42	75.0	
Old	4	3	5.4	
Protozoa				
Young	6	-	-	
Adult	46	1	1.8	
Old	4	-	-	

For nematodes, the infection rate related to age was 10.7%, 75.0% and 5.4% in young, adult and old horses, respectively. Breed-specific prevalence was 12.5% in local and 78.6% in exotic. In male horses, prevalence was 25.0% and in female 66.1% (Table 2). The EPG category in relation to breed, sex and age are shown in Table 3. There was no association between the prevalence/EPG category and age, sex and breed of horses in this study. However, there was higher occurrence and severe infection in *adults, females and exotic breeds of horses*. Mixed infections were also seen in the combinations of *Strongylus spp and Parascaris equorum (1.8%)*; *Strongylus spp and Strongyloides spp (1.8%)*; *Strongylus spp and Eimeria spp (1.8%)*. Among horses with individual species infection, *Strongylus spp* was the most prevalent (82.1%) followed by *Strongyloides spp (3.6%)* (Table 4).

Table 3: EPG category in relation to predisposing factors.

Variable	Light	Moderate	Severe	Chi square value
Breed				0.315
Local	1	0	5	
Exotic	15	10	20	
Sex				0.157
Male	4	0	9	
Female	12	10	16	
Age				0.634
Young	1	1	4	
Adult	15	8	19	
Old	0	1	2	

Table 4: Prevalence of gastrointestinal parasites in infected polo horses.

Parasites	Frequency	Percentage (%)
<i>Strongylus</i> spp.	46	82.1
<i>Strongyloides</i> spp.	2	3.6
<i>Strongylus</i> spp. & <i>Parascaris equorum</i>	1	1.8
<i>Strongylus</i> spp. & <i>Strongyloides</i> spp.	1	1.8
<i>Strongylus</i> spp. & <i>Eimeria</i> spp.	1	1.8

DISCUSSION

This study revealed a high prevalence (92.9%) of gastrointestinal parasites in polo horses in Ibadan. This agrees with **Eze et al., (2019) and Chemedo et al., (2016)** reports who also found a high prevalence of 93% and 94% in horses in Nigeria and Ethiopia. Also, previous studies in Nigeria and different countries have reported prevalence of GIPs ranging from 62%- 92% (**Umar et al., 2013; Wosu and Udobi 2014; Dogo et al., 2017; Eze et al., 2019; Ola-Fadunsin et al., 2019; Kompi et al., 2021; Mathewos et al., 2021**). All these findings corroborate the fact that GIT parasitism is common in horses in different countries. The divergence in the results could be related to the use of anthelmintics, poor management system, climatic and environmental differences, nutritional and immune status of the studied horses, level of stable hygiene, grazing practices and season of sampling (**Belete and Derso, 2015**).

Moreover samples were collected during the beginning of wet season which is distinguished by high humidity and relatively moderate temperature, promoting vegetation growth, parasite development, and higher chances of infective larval transmission to grazing animals (**Umar et al., 2013**). When the pasture environment or hand cut grasses get contaminated, the animals may become re-infected even after the routine treatment regime has been completed.

In this study, nematodes were the most numerous and common GI parasites found, with *Strongylus* spp. being the most common of all. According to reports, nematodes are the most numerous, ubiquitous, common, and diversified category of GI helminthes in horses (**Bulgaru and Tudor, 2016; Wondimu and Sharew 2017; Romero et al., 2020**). This may be attributed to the direct life cycle of this group of helminthes, which eliminates the need for an intermediate host, making infection and life cycle completion faster (**Umar et al., 2013; Wosu and Udobi 2014; Ola-Fadunsin et al., 2019**). *Strongylus* spp has the ability to bring about blood clots, obstruct arteries and arterioles in the intestine, and result in ischemia and septic peritonitis (**Pihl et al., 2018**).

The *Eimeria* species has been identified as the most common gastrointestinal protozoan that infects horses in Nigeria (**Useh et al., 2005; Ehizibolo et al., 2012**). *Eimeria* spp can cause erosion of the epithelia layer of the intestine, resulting in diarrhea (**Taylor et al., 2016**). It has been reported to affect young horses (**Dubey and Bauer, 2018**), however, the only *Eimeria* spp found was in an adult horse. This findings is similar to **Ola-Fadunsin et al., (2019)**'s report and could be explained by the fact that mature horses receive less medical attention when it comes to *Eimeria* infection treatment, due to the common misconception among horse owners that adult horses are resistant to the infection.

Faecal egg count is an important marker in gastrointestinal parasites epizootiology since it reveals the degree and intensity of parasitism (**Egbe-Nwiyi et al., 2019**). The severe infection observed in the female horses could be as a result of stress caused by cyclical hormonal changes, which may have suppressed their immune systems (**Ademola and Onyiche 2013**). It was also revealed that adult and exotic breed of horses had severe infection. This demonstrates that the parasites were able to mature and replicate efficiently in the infected horses, and it may also imply the absence of effective deworming programs at the polo stables. The severe infection observed in this study is in contrary to **Umar et al., (2013)** findings who found high proportion of light infections among horses used for cadets' training in Nigerian Defence Academy.

The presence of mixed infections among the horses could be attributed to the rate of environmental contamination with viable helminthic eggs and sporulated oocysts at a specific time. Mixed infections of gastrointestinal parasites found in this study have also been reported by **Eze et al., (2019) and Ola-Fadunsin et al., (2019)** in other states.

CONCLUSION

In conclusion, the high prevalence and frequent occurrence of severe infection of gastro-intestinal parasite observed shows that, helminthiasis continues to be a problem of polo horses in Ibadan. The presence

of these parasites will have a negative impact on this animal's general well-being. Regardless of age, sex or breeds, there is need for improved veterinary care, investigation of the efficacy of available anthelmintics and susceptibility of parasites for improved horse health and optimal performance.

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Declaration of Conflicting Interests

The authors declare that they have no conflict of interest.

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