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Survey of Gastrointestinal Parasites and Ectoparasites of Horses (Equine Equine) in Port Harcourt and Abarka Polo Field, South Southern Nigeria

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Abstract: ***Gastrointestinal parasites of horses in South Southern Nigeria have not been documented previously. This study was therefore undertaken to determine the prevalence of gastrointestinal parasites and ectoparasites in horses (Equus caballus) in Polo Fields of Abraka and Port Harcourt in South Southern Nigeria during June 2017 to October 2017. One hundred faecal horse samples, (22) in Abraka and (78) in Port Harcourt Polo Fields were examined (using standard parasitological techniques for helminthes and ectoparasites. Soil samples from the two fields were also collected and examined. Out of the 100 horse faecal samples examined, (93%) were infected. The infection was more (100%) in Abraka polo and lowest71 (91.0%) in Port Harcourt polo field. The prevalence of gastrointestinal helminthes across the study locations are; Draschiame gastoma (14.0%), Tridontophorus tenicollis (7%), Trichostrongylus axei (49%), Strongylus sp (80%), Dictyocaulus arnfieldi (35%), Paranocephala mannilla (1.0%), Eimeria leukarti (4.0%), Strongyloide sp (48.0 %), Cyathostome sp (42.0%), Parascaris equorum (5.0%) and Oxyuris equi (1.0%). Differences were not significant (p>0.05). Prevalence of ectoparasite across the study location were Boophilus sp (23%) and Rhipicephalus sanguineus (36%). Mono-infection accounted for 22%while poly-infection accounted for 24% of the total infections. The prevalence of five helminthes; Dictyocaulus sp, Strongyloide sp, Trichuris trichuria, Toxocara sp and Enterobius vermicularis recovered from the soil samples were of 20%, 30%, 20%, 10% and 10% respectively. This prevalence is a call for public health intervention across the study location.***

Keywords: Gastrointestinal, Helminths, Ectoparasites, Polo fields, *Equus caballus*

1. Introduction

The horse (order: perrisodactyla) is an odd-toed hoofed mammals. The family; Equidae includes all living horses, donkeys, zebras and on agers as well as their extinct ancestors. Horses and humans interact in many ways through sports competition, police work, agriculture, entertainment and warfare. Many important products derived from horses, include meat, milk, hide, bones, blood, hooves and pharmaceuticals (Ahern *et. al.,* 2006). Horses among most domestic animals have been reported to be more susceptible to a large number of parasites and may harbour different species at a given time (Wannans *et. al*., 2012). Parasitic helminthes are one of the most common factors that constrain the health and working performance of donkeys and horses worldwide. They cause various degrees of damage depending on the species and number at present, nutritional and the immune status of eqiuds (Asefa *et al*., 2011). They decrease the performance, production and productivity in acute case (Ramaswamy, 1994).

They can also act as vectors between domestic animals and humans, causing a number of diseases, some of which are Zoonotic (Stephen and John, 2003). Horses are afflicted by several diseases that hamper their productivity (Rabo *et al*., 1995). Ticks, lice, mites and mosquitoes are common external parasites of horses while blood and gastrointestinal (GI) parasites are considered as common internal parasites. Horses are susceptible to more than 60 gastrointestinal parasites and may harbour several species of worms (Ananzi and Alyousif, 2011). These parasites have the potential to cause serious diseases such as diarrhoea, emaciation, colic, anaemia, haemorrhage and even death. In addition, performance, weight loss and poor growth conditions are associated with diseases of horse (Ananzi and Alyousif, 2011). This condition is more sever in young and undernourished horses and mares (Lyons *et al*., 2012). Studies have reported several gastrointestinal parasites of horse (Love *et al.,* 1999). These includes; *Strongyles*, ascarid; *Parascaris equorum (*in foals), pinworm; *Oxyuris equi* and lungworm *Dictyocaulus arnfieldi* as, cestodes *Anoplocephala perfoliata and Tritrichomonas equiis*. These parasites are the most common parasitic fauna which inhabit the large intestine of the horses and causes diarrhoea in foals elsewhere (Mair *et al.,* 2002, and Lun *et al.,* 2005). However, gastrointestinal parasites of horses in South Southern Nigeria have not been documented. Horses and donkeys have often been described as sturdy animals and succumb to a variety of diseases. Increased awareness of the risk of zoonotic infections associated with horses is needed pre-requisite for controlling horse-man infections (Anne and Gary 2006). This information is scarce in South Southern Nigeria. This study was therefore design to determine the prevalence of gastrointestinal parasites of horses (Equine equine) in Port Harcourt and Abarka Polo field.

2. Materials and Methods

Study Area

A cross sectional study was conducted between June toSeptember2017on Equine horses kept by organized polo

clubs located in Polo Club, Port Harcourt, Rivers State and Abraka Turf and Country Club of South-southern in Delta State Nigeria. Horses used in this study were stabled and maintained by organized Polo Clubs in Abarka, Delta State and Port Harcourt Rivers State. These horses are used for polo sport tournaments and for recreational purposes. They are stabled and supplied with straw, crop residuals from millets and concentrates. Most times, they are allowed to graze in open fields and were under good grooming. The age of the Equines were determined by dentition and owner's information. During the study, the animals were grouped into three categories as young (<4yrs), adult (4-10yrs) and old (>10yrs) and the age of studied animals were determined based on dentition and owner's information. The study animals had not received anthelminthic treatment two months ago from the period of study but had always been groomed for ectoparasites.

Faecal collection and examination

Faecal samples were collected directly from the rectum of individual animal using transparent polythene hand gloves under proper restraints according to standard procedures in (Stoltenow and Purdy, 2003). . The tails of the restrained horses were raised gently and the gloved fingers were inserted into the anal opening from which a small quantity of faeces was collected, tied and labelled appropriately. Collected samples were transported to the laboratory for analysis within 12-24 hours. Faecal samples were observed macroscopically for the presence of adult helminths and for the larvae of botfly. Faecal examination was carried out by direct smear and floatation techniques employing saturated sodium chloride solution as the floating medium as described in (Cheesbrough, 2005). Eggs were identified based on their morphology using the standard identification key of Souls by (1982).

Ectoparasite collection and examination

Ticks were collected either by handpicking or restraining the horses on a white sheet cover on which they are groomed with a hand brush for the recovery of the ticks. Ticks were collected at predilection sites- head, body, groin and rectum region, which were packed in plastic vials containing 70% ethanol, labelled appropriately and was transferred to the laboratory for identification. Identification and grouping of the tick to genus and species was based on the morphology and structure of the tick as described in Walker *et al.,* (2003) guide to identification of species as revised in 2014.

Soil sample collection and examination:

Purposive sampling of soil samples was made on the polo in the two locations. Criteria for inclusion for the soil samples are: 1. areas where soil transmitted nematode (STH) are most likely to survive, 2. Where human exposure occurs and animal defecation sites 3. Moist areas 4. Places where children were observed to have played. About 50g of soil samples were collected from 20 separate cores of 2-5cm depth using a hand trowel. The soil samples were air dried to remove moisture. Air dried soil samples were sieved with a fine sieve of 250µm, in order to allow helminth eggs to pass through. Floatation method was used for recovery of parasites from the soil samples. The procedures for floatation method follow standard techniques (Cheesbrough, 2005). Identification of helminths was done using the Web Atlas of Human Parasitology.

Statistical Analysis

Data collected were analysed using SPSS software version 16. Differences among means were determined using Chi-square at confidence level 0.05

3. Results

A total of 100 faecal samples were collected; 78 samples from Port Harcourt Polo field and 22 from Abraka. A total of eleven gastrointestinal parasites were recorded from the animals. This comprises of nine nematodes species (*Draschiame gastoma*, *Tridontophorus tenicollis*, *Trichostrongylus axei, Strongylus sp, Dictyocaulus arnfieldi, Strongyloide sp*, *Cyathostome sp, Parascaris equorum, Oxyrus equi), one*cestode (*Paranocephala manila*) and one protozoa (*Eimerial eukart*). The differences in the occurrence of these parasites were significantly (χ2=, *P*< 0.05). Parasites occurrence in order of frequency are; *Strongyle sp (*80.0%), *Trichostrongylus axei* (49%), *Strongyloide sp (*48.0 %), *Paranocephala manila* and *Oxyrus equi* (1.0%) (Table 1). Out of the 100 horses sampled, (93%) were infected with one or more of the intestinal parasite species. Horses in Abraka polo field had the highest prevalence of infection 100% while Port Harcourt polo field had the prevalence of 91.0%. Differences in the Infection rates across the study locations were not statistically significant (χ^2 =, $p > 0.05$) (Table 2). Male horses had higher prevalence (93.5%) than female horses (92.6%). Differences in sex specific prevalence of infection was not statistically significant (χ^2 =, *p>0.05*) Fig 1. The Parasite specie prevalence was also sex specific. *Draschiame gastoma*, *Trichostrongylus axei* and Parascaris *equorum* in female horses accounted for the prevalence of 16.7%, 51.9% and 7.4% respectively. *Paranocephala manila, Eimeria leukarti and Oxyrus equi* was associated with the male horses (Table 3). There was disparity in the infection rates by age. Infections increased as age increases. The prevalence of infections of old horses (>10yrs), Adults (4-10yrs) and Young (<4yrs) horses are 100%92.3% and 89.7% occurred in respectively (Table 4). Mixed infection accounted for (88.2%) prevalence of the total population and varies across study location (Table 5). Ectoparasites were observed more in male (52.2%) than in female (40.7%), more in younger horses (58.6%) than in older horses 52.6% and adults 36.5% (Table 6-7). Five Parasites specied were recovered from the soil samples from the two study locations. They are *Ascaris lubricoides (*62.5%), *Dictyocaulus sp (*27.5%), *Strongyloide sp* (2.0%), *Trichuris trichiura (*47.5%) and *Toxocara sp (*20%) respectively (Table 8).

Table 1: Total number of gastrointestinal parasites recovered from the study

Species , n=100	No. of infected (%)
Draschiame gastoma	14 (14.0)
Tridontophorus tenicollis	7 (7.0)
Trichostrongylus axei	49 (49.0)
Strongylus sp	80 (80.0)
Dictyocaulus arnfieldi	35 (35.0)
Paranocephala manila	1 (1.0)
Eimeria leukarti	4 (4.0)
Strongyloide sp	48 (48.0)
Cyathostomin	42 (42.0)
Parascaris equorum	5 (5.0)
Oxyrus equi	1 (1.0)

No. of examined horses, n=100

Table 2: Distribution of gastrointestinal parasites of equine from study locations

		Species of parasites (%)											
Study Location	No examined	No infected (%)	D. mega	T. teni	T. axei	Strong sp	D. arnfi	P. manni	E. leuk	Strongy sp	Cyathostome	P. Equo	O. Equi
PH	78	71 (91.0)	6 (7.7)	6 (7.7)	39 (50.0)	58 (74.4)	31 (39.7)	1 (1.3)	3 (3.8)	38 (48.7)	39 (50.0)	4 (5.1)	0 (0.0)
Abraka	22	22 (100.0)	8 (36.4)	1 (4.5)	10 (45.5)	22 (100.0)	4 (18.2)	0 (0.0)	1 (4.5)	10 (45.5)	3 (13.6)	1 (4.5)	1 (4.5)
Total	100	93 (93.0)	14 (14.0)	7 (7.0)	49 (49.0)	80 (80.0)	35 (35.0)	1 (1.0)	4 (4.0)	48 (48.0)	42 (42.0)	5 (5.0)	1 (1.0)

D. mega: Draschiame gastoma, T. teni: Tridontophorus tenicollis, T. axei: Trichostrongylus axei, Strong sp: Strongylus sp, D. arnfi: Dictyocaulus arnfieldi, P. manni: Paranocephala manila, E. leuk: Eimeria leukarti, Strongysp: Strongyloide sp, Cyathostome: cyathostome, P. Equo: Parascaris equorum, O. Equi: Oxyrus equi.

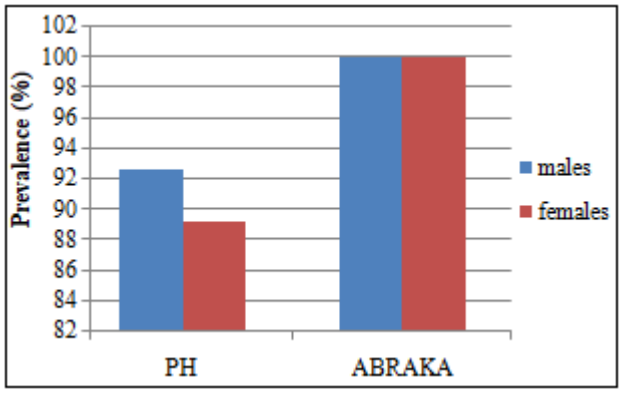

Figure 1: Sex related prevalence of gastrointestinal parasites based on study locations

Table 3: Distribution of gastrointestinal parasites based on sex of equine horses

			Species of parasites (%)										
Sex	No examined	No infected (%)	D. mega	T. teni	T. axei	Strong sp	D. arnfi	P. manni	E. leuk	Strongysp	Cyathostome	P. Equo	O. Equi
Male	46	43 (93.5)	5 (10.9)	4 (8.7)	21 (45.7)	37 (80.4)	21 (45.7)	1 (2.8)	4 (8.7)	24 (52.2)	20 (43.5)	1 (2.2)	1 (2.2)
Female	54	50 (92.6)	9 (16.7)	3 (5.6)	28 (51.9)	43 (79.6)	14 (25.9)	0 (0.0)	0 (0.0)	24 (44.4)	22 (40.7)	4 (7.4)	0 (0.0)
Total	100	93 (93.0)	14 (14.0)	7 (7.0)	49 (49.0)	80 (80.0)	35 (35.0)	1 (1.0)	4 (4.0)	48 (48.0)	42 (42.0)	5 (5.0)	1 (1.0)

D. mega: Draschiame gastoma, T. teni: Tridontophorus tenicollis, T. axei: Trichostrongylus axei, Strong sp: Strongylus sp, D. arnfi: Dictyocaulus arnfieldi, P. manni: Paranocephala manila, E. leuk: Eimeria leukarti, Strongysp: Strongyloide sp, Cyathostome: cyathostome, P. Equo: Parascaris equorum, O. Equi: Oxyrus equi.

Table 4: Prevalence of gastrointestinal parasites per age of equine horses

			Species of parasites (%)										
Age of horses	No examined	No infected (%)	D. mega	T. teni	T. axei	Strong sp	D. arnfi	P. manni	E. leuk	Strongysp	Cyathostome	P. Equo	O. Equi
Young (<4)	29	26 (89.7)	3 (10.3)	1 (3.4)	12 (41.4)	20 (69.0)	10 (34.5)	0 (0.0)	1 (3.4)	13 (44.8)	14 (48.3)	3 (10.3)	1 (3.4)
Adult (4-10)	52	48 (92.3)	6 (11.5)	4 (7.7)	25 (48.1)	43 (82.7)	21 (40.4)	1 (1.9)	3 (5.8)	24 (46.2)	24 (46.2)	1 (1.9)	0 (0.0)
Old (>10)	19	19 (100.0)	5 (26.3)	2 (10.5)	12 (63.2)	17 (89.5)	4 (21.1)	0 (0.0)	0 (0.0)	11 (57.9)	4 (21.1)	1 (5.3)	0 (0)
Total	100	93 (93.0)	14 (14.0)	7 (7.0)	49 (49.0)	80 (80.0)	35 (35.0)	1 (1.0)	4 (4.0)	48 (48.0)	42 (42.0)	5 (5.0)	1 (1.0)

D. mega: Draschiame gastoma, T. teni: Tridontophorus tenicollis, T. axei: Trichostrongylus axei, Strong sp: Strongylus sp, D. arnfi: Dictyocaulus arnfieldi, P. manni: Paranocephala manila, E. leuk: Eimeria leukarti, Strongysp: Strongyloide sp, Cyathostome: cyathostome, P. Equo: Parascaris equorum, O. Equi: Oxyrus equi.

Table 5: Mixed infection based on study location

Mixed infections	Port Harcourt n =71	Abaraka n =22	Total n =93
Strongylus + Strongyloide	6 (8.4%)	2 (9.1)	8 (8.6%)
Strongylus + T. axei	6 (8.4%)	2 (9.1%)	8 (8.6%)
Strongylus + D. megastoma	0 (0.0%	3 (13.6%)	3 (3.2%)
Strongylus + D. arnfieldi	5 (7.4%)	0 (0.0%)	5 (5.3%)
Strongylus + Cyathostome	3 (4.2%)	4 (18.2%)	7 (7.5%)
Strongylus + T. axei + Cyathostome	7 (9.9%)	0 (0.0%)	7 (7.5%)
Srongylus + T. axei + Strongyloide	4 (5.6%)	1 (4.5%)	5 (5.3%)
Strongylus + D. megastoma + T. axei	0 (0.0%)	3 (13.6%)	3 (3.2%)
Strongylus + Strongyloide + Cyathostome	4 (5.6%)	0 (0.0%)	4 (4.3%)
Strongylus + D. armfieldi + Strongyloide	2 (2.8%)	1 (4.5%)	3 (3.2%)
T. axei + D. arnfieldi + Strongyloide	4 (5.6%)	0 (0.0%)	4 (4.3%)
Strongylus + D. arnfieldi + Strongyloide + Cyathostome	2 (2.8%)	1 (4.5%)	3 (3.2%)
Strongylus + T. axei + D. arnfieldi + Strongyloide	4 (5.6%)	2 (9.1%)	6 (6.6%)
Strongylus + D. megastoma +T. axei + Cyathostome	2 (2.8%)	0 (0.0%)	2 (2.2)
T. axei + D. arnfieldi + Strongyloide + Cyathostome	4 (5.1%)	1 (4.5%)	5 (5.3%)
Strongylus +T. axei + D. arnfieldi + Strongyloide + Cyathostome	9 (9.6%)	0 (0.0%)	9 (9.7%)
Total	62 (87.3)	20 (90.9)	82 (88.2%)

Table 6: Prevalence of Ectoparasites in relation to sex

Sex	No. Examined	No. Infected (%)	*Boophilus sp*	*Rhipicephalus sanguineus*	*Boophilus sp +Rhipicephalus*
Male	46	24 (52.2)	12 (26.1)	17 (37.0)	5 (10.9)
Female	54	22 (40.7)	11 (20.4)	19 (35.2)	9 (16.7)
Total	100	46 (46.0)	23 (23.0)	36 (36.0)	14 (14.0)

Table 7: Prevalence of Ectoparasites in relation to age

Age	No. Examined	No. Infected (%)	*Boophilus sp*	*Rhipicephalus sanguineus*	*Boophilus sp + Rhipicephalus sanguineus*
Young (< 4)	29	17 (58.6)	11 (37.9)	14 (48.3)	8 (27.6)
Adult (4-10)	52	19 (36.5)	7 (13.5)	13 (25.0)	2 (3.8)
Old (> 10)	19	10 (52.6)	5 (26.3)	9 (47.4)	4 (21.1)
Total	100	46 (46.0)	23 (23.0)	36 (36.0)	14 (14.0)

Table 8: Prevalence of soil transmitted helminthesat various sites of the polo field

Soil transmitted helminths (%)						
Site of collection	No. soil samples examined	*Dictyocaulus spp*	*Strongyloides spp*	*Ascarislumbricoides*	*Trichuris trichuria*	*Toxocara spp*
Faecal dumpsite	10	4 (40.0)	2 (20.0)	8 (80.0)	5 (50.0)	8 (80.0)
Walk path	10	7 (70.0)	4 (40.0)	4 (40.0)	4 (70.0)	0 (0)
Field	10	0 (0)	6 (60.0)	7 (70.0)	4 (70.0)	0 (0)
Stand post	10	0 (0)	5 (50.0)	6 (60.0)	6 (60.0)	0 (0)
Total	40	11 (27.5)	17 (42.5)	25 (62.5)	19 (47.5)	8 (20.0)

4. Discussion

The prevalence of gastrointestinal helminth infection recorded among the horses in the study location was high (93%). The study also recovers eleven helminths parasites from the horses. The high prevalence of different helmintic parasite in the study location highlighted the poor and primitive methods of horse management in the study location. It also shows that very little or no veterinary services are rendered to these horses in order to prevent or control the diseases.

The prevalence of parasitic infection of horses in this present study a bit lower than the 100% prevalence recorded by Mbafor *et al.,* (2012), Uslu and Guclu (2007) and higher than the report of Tesfu *et al*., (2014) and Matto *et al*., (2013) who found prevalence at 63.7% and 20.63% respectively. The discrepancy in the results may be attributed to the differences in the biology of the parasite in relation to climatic conditions, the use of anthelminthic, grazing methods, exposure of the horses to pasture field and poor management system.

The high prevalence intestinal parasites were higher than the report of Mbafor et *al.,* (2012). The higher helminthic parasites in this present study could be attributed to exposure to grazing on infected fields. Equine tapeworm had a low prevalence as compared to the finding of Belay *et al.,* (2016) who observed 3.1% prevalence. *Strongyloides sp* was observed to have a prevalence of 48% which is higher than the work of Matto *et al.,* (2015). Foals are most time infected through the process of parturition and are associated with humid climates and poor sanitation standards (Roberts and January, 2005). The high rate of *Strongyloidessp may be* due to inconsistency in horse treatment practices and poor hygiene. *Eimeria leukarti* is ahelminth protozoa and is commonly seen in foals. *Cyathostomin* had a prevalence of 42% which was higher compared to 12.49% recovered by Mbafor *et al.,* (2012). The prevalence of *Parascaris equorum was (*5%). This result was a little bit lower than the

report of Belay *et al.,* (2016) who reported a prevalence of 3.1%. However, result in this present study was 10 folds lower than the55.8% prevalence reported by Tilahun *et al.*, (2014), 20.8% reported in Tsegay and Chala (2015) in Haramya town and 42.29% reported by Mezgebu *et. al*., (2013) in and around Gondar. *Oxyrus equi* had a lower prevalence compared to the findings of Saleh *et al.,* (2016) and Wosu and Udobi (2014) who reported 17.5% and 30.2% prevalence respectively in donkeys of North Eastern Nigeria. The low prevalence may be attributed to the relatively high temperature in the present study location which may have desiccated the *Oxyrus equi* eggs (Mezgebu *et al*., 2013).

Male horses had higher infestation than female horses. This report is consistent with Umar *et al.,* (2013) but contrast Francisco *et al*., (2009) who recorded a higher prevalence in females. Higher infection rates among the older horses are indication that the older population were more exposed to infection during foraging. Mixed infections found among the horses highlight their ability exploit wide range environment during foraging. The similar genus of ticks (*Rhipicephalus* and *Boophilus)* observed in this present study agrees with Garba *et al.,* (2011). These ticks *are* the nativity of Nigeria and are widely distributed. Although the disparity in the level of infestation could be attributed to the level of activity of the horses (Garba *et al*., 2011), the grooming practices, parasite control measures, management practices may be responsible for the high infestation in this present study. Prevalence of soil transmitted helminth had been reported in Eze *et* al., (2016). There is the possibility that horses are re-infectivity through contaminated soil.

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