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SEASONAL OCCURRENCE OF GASTROINTESTINAL PARASITES IN HORSE (*EQUUS FERUS CABALLUS*) FROM DHAKA CITY BANGLADESH

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Abstract: The study was conducted to understand the occurrence of gastrointestinal parasites in horse during June, 2017 to April, 2018 from Bangladesh National Zoo, Puran Dhaka and Rajarbagh Police Line of Dhaka city. A total of 48 faecal samples were collected from horses and examined by Direct Smearing technique and Formol Ether Concentration technique. Out of 48 samples 47 found positive for gastrointestinal parasitic infection with an overall prevalence of 97.92 %. Highest prevalence was identified (77.1 %) in *Parascaris equorum,* followed by 70.8 % in *Hymenolepis nana*, 62.5 % in *Isospora* sp., 50 % in *Ancylostoma duodenale*, 39.6 % in *Toxocara* sp., 35.4 % in *Entamoeba* sp., 25 % in *Trichuris* sp., 20.8 % in *Fasciola hepatica* 16.67 % in *Capillaria* sp., 8.3 % in *Taenia* sp. and *Opisthorchis sinensis*, 4.2 % in *Moniezia benedeni* and *Thysaniezia* sp. Highest intensity (72.97± 46.32) was found for *Isospora* sp. The p value was 0.01, $p < 0.05$ so the prevalence rate was statistically significant.A significant difference was founded in prevalence between male and female horse where females were highly infected and also seasonal variation showed significant differences. Highest prevalence was recorded in winter and Rainy season (100 %) followed by summer (95 %). The intensity of parasites was highest in rainy season (63.38 ±79.94) followed by summer (55.47 ±29.73) and winter (49.5 ±28.58).

Key words: Occurrence, gastrointestinal parasites, horse, seasons.

INTRODUCTION

Bangladesh is an agro-based country where livestock plays an essential role in improving rural farmers' socio-economic position. (Alam *et al.* 2015). Livestock contributes 1.78 percent to overall GDP and 12.64 percent to agriculture (Bangladesh Economic Review 2014). Both in urban and rural resource poor communities, horses are the essential source of agricultural energy and transport specially in developing world (Biffa and Woldemeskel 2006, Swann 2006). Horses and humans interact in a wide range of sporting

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events and non-competitive recreational pursuits, as well as in professional settings like law enforcement, agriculture, entertainment, and therapy. Wildlife captivity provides an unnatural system that upsets the equilibrium between parasite and host, generates a stressful environment, and causes animals to become ill or even die from parasite burdens that they would have survived in natural conditions. (Van Wyk and Boomker 2011). Parasite spread can be facilitated due to conditions produced by intensive animal husbandary. Zoo animals are maintained in confined areas which causes environmental contamination which creates a major concern for zoo animals. (Zasityte and Grikienciene 2002; Pencheva 2013).

A mixture of both external and internal parasites can infest horsed and it can be serious in young and undernourished horses ans mares (Hardin 1997; Anazi and Alyousif 2011; Brucknell *et al.* 1995; Lind *et al.* 1999; Larsen *et al.* 2002; Francisco *et al.* 2009; Lyons *et al.* 2012). Nematodes, parasites strongyles (*Strongylus* spp.), ascarids (*Parascaris equorum*), pinworms (*Oxyuris equi)* and bots (*Gasterophilus* spp.) have the highest prevalence. The most commonly diagnosed infections in horses among nematodes are strongyle and *Parascaris equorum* (horse ascarid) infections are (Epe *et al.* 2004; Hinney *et al.* 2011; Rehbein *et al.* 2013).

Most harmful parasite Strongyloides infect horse of all ages and can cause weight loss, weakness, anemia, diarrhea and even death (Khan *et al.* 2015). *Parascaris equorum* is highly prolific parasite and produces millions of extremely resistant eggs daily (Mitrea 2011). Besides strongyle and ascarid infections h Pinworm (*Oxyris equi*), lungworms (*Dictyocaulus arnfieldi*), *Habronema* and *Draschi*orse infects the horse GI tract frequently (Brucknell *et al.* 1995, Francisco *et al.* 2009, Anazi and Alyousif 2011). Unless control measures such as a regular preventive deworming program and good management techniques to restrict parasite spread are implemented on a regular basis, the problem would most likely worsen, resulting in serious injury and death. (Watson *et al.* 2007). The type of parasite, seasonal climate variations in the area, the housing and feed sources employed, management tactics, and the age of the horse are all important factors in effective intestinal worm control. (Watson *et al.* 2007). Large and tiny Strongyles, as well as threadworm (Strongyloides westeri), have the highest occurrence rate, according to prior research. However, in all prior studies, the prevalence of *Parascaris equorum* was recorded as the second highest, but the prevalence was significantly lower than the current rate Mezgebu et al. (2013) reported a 43.8 percent prevalence, Sultan et al. (2014) a 15.51 percent prevalence, Anazi and Alyousif (2011) a 28.8 percent prevalence, Khan et al. (2010) a 36 percent prevalence, Adeppa et al. (2016) a 10.71 percent

prevalence, and Musa et al. (2016) a 1.59 percent prevalence of *Parascaris equorum*. The variation in prevalence rates could be attributable to the geographic and climatic conditions, as well as the management procedure. *Parascaris equorum* eggs can resist severe conditions such as drying or freezing and hatching of larvae occasionally occurs in such circumstances (Soulsby, 1962) Hot and dry environment can be harmful for these parasites though they can survive freezing weather. Larvae can survive to up to seven weeks at summer temperatures and up to 31 weeks at winter temperatures.

Habronema muscae, Habronema microstoma and *Drachia megastome* live in the horse stomach., *Habronema* species live under a thick mucus coat on the surface of the stomach while *Drachia* live in large nodules in the stomach wall. THouse fly is the vector of these parasites. Donkeys and mules are common hosts of lungworms (*Dictyocaulus arnfieldi*) though they are frequently found in horses.. Lungworms eggs from gastrointestinal tract are passed out through host feces (Bliss 1999).

Cestodes and trematodes are also observed in horses. most common cestode in horses worldwide is *Anoplocephala* (Soulsby 1982, Taylor *et al*. 2007, Anderrsen *et al*. 2012, Gatachew *et al*. 2012). Orbit mites that live on pastures transmit Tapeworms (*Anoplocephala magna, Anoplocephala perfoliata* and *Paranoplocephala mammillana*) to horses by being ingested with grass. Serious illness including diarrhea, emaciation, colic, anaemia, haemorrhage and even death (Anazi and Alyousif 2011) are caused by these parasites. Of all the domestic livestock in Bangladesh, Prevalence and type of internal parasites affecting horses have not been determined to a great extent in Bangladesh though the prevalence and type of internal parasites affecting horses are highest of all domestic livestock and being continually exposed throughout their lives.

MATERIAL AND METHOD

The present study was done to investigate seasonal prevalence of gastrointestinal parasites in horse. Examination of faecal samples were done in Parasitology Laboratory, Dept. of Zoology, University of Dhaka. The study was conducted during the period of June, 2017 to April, 2018. This study was divided into three seasons in spite of being six seasons in Bangladesh (Chowdhury *et al.* 1979). Some seasons are short and continue with the other seasons (Banglapedia). A total of 48 faecal samples were collected from horse of three regions in Dhaka city. Out of 48 samples 8 samples were collected from Bangladesh National Zoo, 20 samples from Old Dhaka and 20 samples from Rajarbagh Police Line. These places were chosen because these are the locations where horses are kept for different purposes. Old Dhaka for transportation

purposes, Police line for professional purposes and zoo for recreational purposes. These three places also has different kind of environment. Old Dhaka where horses are kept has an unhygienic environment and horse are kept in nonscientific way, while in zoo and pilice line horses are kept in captive protective scientific way. During sample collection the selected horses have been properly examined to collect different information related to the parasites. Age, sex, season were recorded carefully at the time of sample collection. The age of the selected horses was in between 4-18 years old in this study. Age of the selected horses was categorized into following three groups-: 4 year- 8 year, 9 year- 13 year and 14 year- 18 year. Age of the horses was confirmed by the keepers.

The faecal sample was collected randomly from the fields in the morning. Most animals defeacate in early morning after eating the previous day. Morning collection of fresh sample is also convenient to perform formol ether concentration technique to identify parasite eggs. Horses are herbivorous and all our study population ate grass and plants irrespective of their location. The c

The collected samples were preserved according to age, sex and season. The faecal samples were preserved in 10% formalin during collection and then kept in 4°C in laboratory. For the detection of parasites egg and ova, Formol Ether Concentration technique was applied (Cheesebrough 1987). The eggs of different helminthes were identified by using compound (10X) microscope. The 40X objective was also used to confirm ova and larvae (non-motile) and cysts. Eggs, ova and larvae observed under the microscope were identified following the descriptions and pictures of Chatterjee (1975), Cheng (1997), Soulsby (1982), Scimidth and Roberts (1989). Terminology was used ccording to Margolis *et al.* (1982) and Bush *et al.* (1997).

RESULTS AND DISCUSSIONS

In this study higher prevalence (77.1%) was recorded for *Parascaris equorum* followed by *Hymenolepis* Highest *nana* (70.8%) and *Isospora* sp. (62.5%). Lowest prevalence (2.1%) was in *Gastrodiscus aegyptiacus* and *Oxyuris equi*. The prevalence of parasite was statistically significant ($p = 0.01$, $p < 0.05$). Highest intensity was observed in *Isospora* sp. (72.97± 46.32) followed by *H nana* (8.47±5.04) *F hepatica* (4.4±1.45) and *P equorum* (2.92±1.31) and lowest intensity was (1±0.04) for *G aegyptiacus* and *O equi* [Table 1]. Out of 15 parasite species, 2 species were protozoa, 3 species were trematode, 4 species were cestode and 6 species were nematode. Prevalence of protozoa was (70.8%), trematode (31.25%),

Table 1: Overall prevalence and intensity of each gastro-intestinal parasite species in horse from three areas of Dhaka city

Name of parasites	No. of host examined	No. of host infected	Prevalence (%)	Total CPG/ EPG	Intensity ±SD
Isospora sp.	48	30	62.5	2189	72.97± 46.32
Entamoeba sp.	48	17	35.4	34	2±0.89
Hymenolepis nana	48	34	70.8	288	8.47±5.04
Taenia sp.	48	4	8.33	4	1±0.15
Moniezia benedeni	48	2	4.2	2	1±0.08
Thysaniezia sp.	48	2	4.2	2	1±0.08
Fasciola hepatica	48	10	20.8	44	4.4±1.45
Gastrodiscus aegyptiacus	48	1	2.1	1	1±0.04
Opisthorchis sinensis	48	4	8.33	6	1.5±0.23
Ancylostoma duodenale	48	24	50	29	1.2±0.63
Parascaris equorum	48	37	77.1	108	2.92±1.31
Trichuris sp.	48	12	25	13	1.1±0.41
Capillaria sp.	48	8	16.67	14	1.75±0.49
Toxocara vitulorum	48	19	39.6	28	1.47±0.70
Oxyuris equi	48	1	2.1	1	1±0.04
Total= 48, p value = 0.01 (p < 0.05)					

Table 2: Prevalence and intensity of gastro-intestinal parasites in male horse

Name of parasites	No. of host examined	No. of host infected	Prevalence (%)	Total CPG/EPG	Intensity ±SD
Isospora sp.	22	12	54.5	1258	104.83
Entamoeba sp.	22	7	31.8	10	1.43
Hymenolepis nana	22	14	63.6	39	2.79
Taenia sp.	22	1	4.5	1	1
Moniezia benedeni	22	0	0	0	0
Thysaniezia sp.	22	1	4.5	1	1
Fasciola hepatica	22	4	18.2	14	3.5
Gastrodiscus aegyptiacus	22	0	0	0	0
Opisthorchis sinensis	22	2	9.1	4	2
Ancylostoma duodenale	22	11	50	14	1.27
Parascaris equorum	22	13	59.1	33	2.54
Trichuris sp.	22	6	27.3	7	1.17
Capillaria sp.	22	3	13.6	8	2.67
Toxocara vitulorum	22	9	40.9	16	1.78
Oxyuris equi	22	1	4.5	1	1
Total= 22, p value = 0.001 (p < 0.0)					

cestode (79.2%) and nematode (93.75%). Intensity of protozoa was (65.4±46.41), trematode (3.4±1.47), cestode (7.8±4.99) and nematode (4.3±2.03). Highest prevalence was observed in nematode (93.75%) and highest intensity was observed in protozoa (65.4±46.41). The prevalence of the parasite was statistically significant (p = 0.02, p < 0.05) [Table 2) **.** Out of 48 samples, 22 samples were from male and 13 parasite species were found. Prevalence (63.6%) was highest in case of *H nana* followed by (59.1%) in *P equorum*. Intensity was highest in *Isospora* sp. (104.83). The prevalence of the parasite was statistically significant (p = 0.001, p <0.05). (Table 2).

Table 3: Prevalence and intensity of gastro-intestinal parasites in female horse

Name of parasites	No. of host examined	No. of host infected	Prevalence (%)	Total CPG/EPG	Intensity ±SD
Isospora sp.	26	18	69.2	931	51.7
Entamoeba sp.	26	10	38.5	24	2.4
Hymenolepis nana	26	20	76.9	149	7.5
Taenia sp.	26	3	11.5	3	1
Moniezia benedeni	26	2	7.7	2	1
Thysaniezia sp.	26	1	3.8	1	1
Fasciola hepatica	26	6	23.1	30	5
Gastrodiscus aegyptiacus	26	1	3.8	1	1
Opisthorchis sinensis	26	2	7.7	2	1
Ancylostoma duodenale	26	13	50	15	1.15
Parascaris equorum	26	24	92.3	75	3.1
Trichuris sp.	26	6	23.1	6	1
Capillaria sp.	26	5	15.4	6	1.2
Toxocara vitulorum	26	10	38.5	12	1.2
Oxyuris equi	26	0	0	0	0
Total= 26, p value = 0.002 (p < 0.05)					

Prevalence and intensity of intestinal parasites in relation to sex of horse: Out of 48 samples, 22 were from male and 26 were from female Prevalence of parasites in female (100%) was higher than in male (95.45%). While, intensity was higher in male (71.71±68.72) than female (48.35±37.20) (Fig. 2. Table 4).

The prevalence (92.3%) was highest in case of *P. equorum* and second highest was for *H nana* (76.9%). Intensity was highest in *Isospora* sp. (51.7). The prevalence of the parasite was statistically significant ($p = 0.002$, $p < 0.05$) (Table 3).

Prevalence and intensity of gastro-intestinal parasites in horse in relation to age: Prevalence of gastro-intestinal parasites was higher (100%) in case of age group (4-8) years and (14-18) years then (96.43%) in (9-13) years and intensity was highest (109.83 ±73.33) in (14-18) years age group (Table 4).

From 48 samples, 8 samples were under (4-8) years age group and 12 parasite species were found (Fig. 3, 4). Prevalence (97.5%) was highest in case of *P equorum* and second highest (87.5%) was for *H. nana*. Intensity was highest in *Isospora* sp. (45±22.50). The prevalence of the parasite was statistically significant ($p=0.002$, $p<0.05$).

From 48 samples, 12 samples were under (14-18) years age group and 11 parasite species were found. Prevalence (66.7 %) was highest in case of *Isospora* sp. followed by 58.3 % and 41.67 % in *Ancylostoma* sp. and *T. vitulorum* respectively. The lowest prevalence was 8.3 % for *Taenia* sp., *M. benedeni* and *Capillaria* sp. Intensity (141.25±77.92) was highest in *Isospora* sp. and lowest in *Taenia* sp. *and M. benedeni* (1±0.15). The prevalence of the parasite was

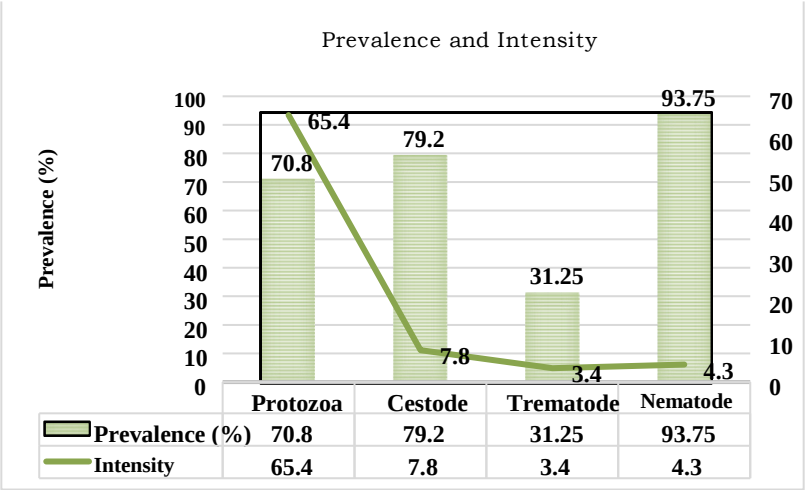


Fig. 1. Group wise prevalence and intensity of parasites among horse from three areas of Dhaka city Total= 48, p value = 0.02 (p<0.05)

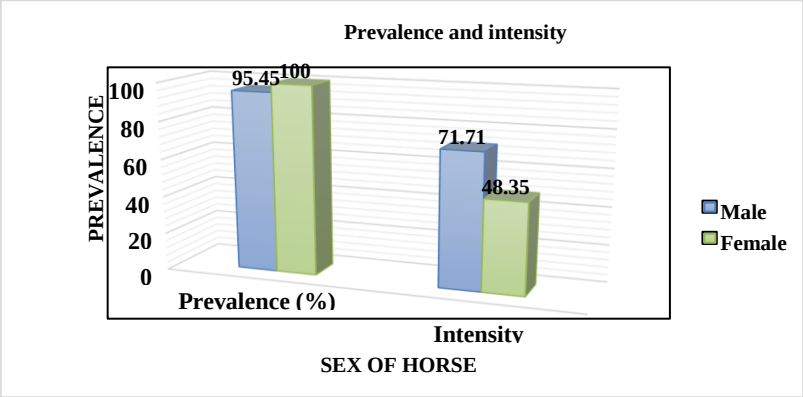


Fig. 2. Overall prevalence and Intensity of gastro-intestinal parasites in male and female horse

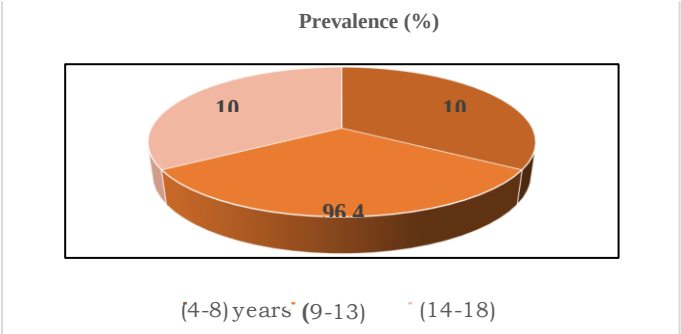


Fig. 3. Prevalence and intensity of gastro-intestinal parasites of horse in relation to age

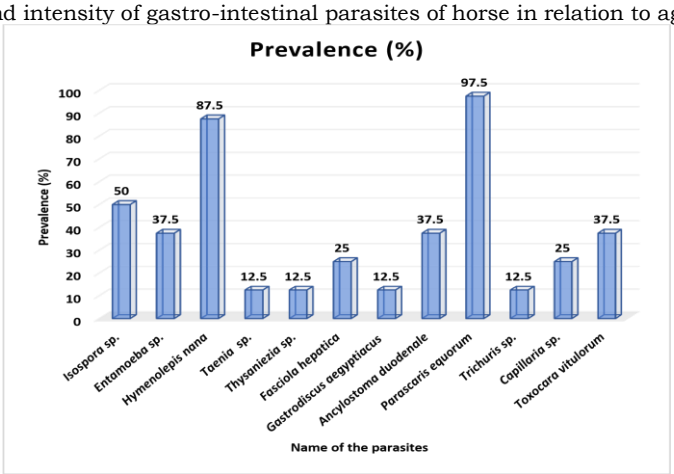


Fig. 4. Prevalence and intensity of gastro-intestinal parasites in (4-8) years host age group

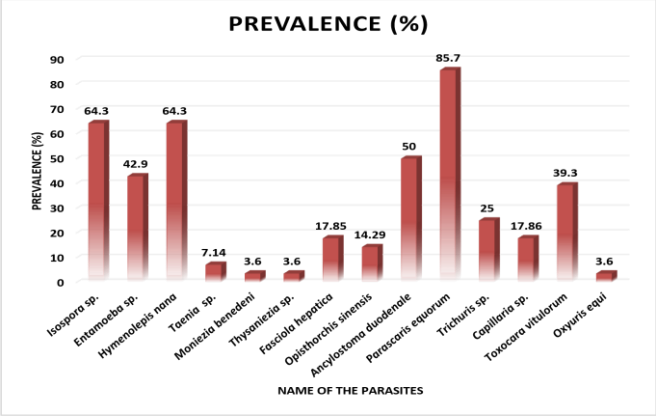


Fig. 5. Prevalence of gastro-intestinal parasites in (9-13) years host age group Total= 12, p value = 0.0007 ($p < 0.05$)

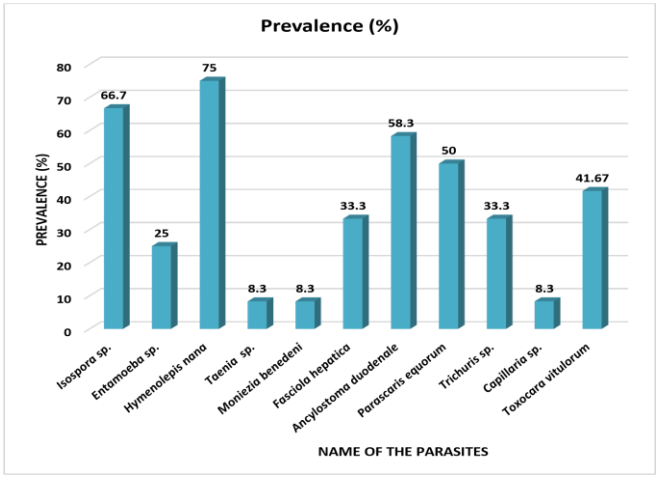


Fig. 6. Prevalence of gastro-intestinal parasites in (14-18) years host age group

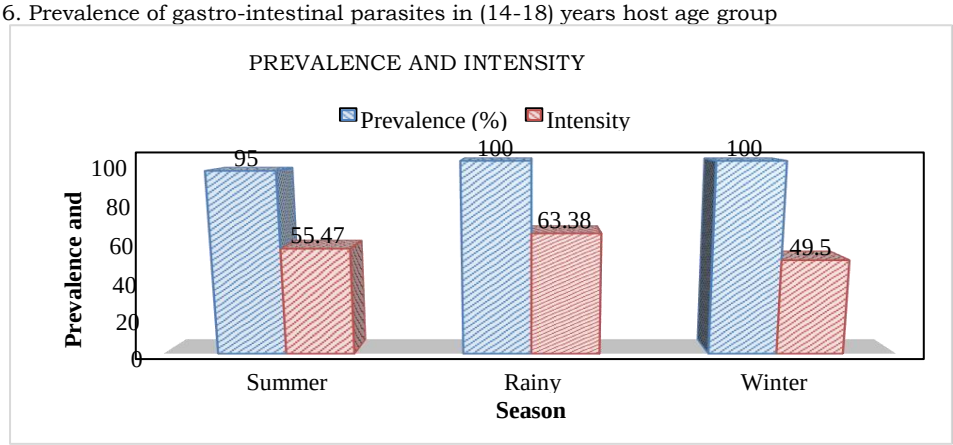


Fig. 7. Overall prevalence and intensity of gastro-intestinal parasites in horse in different seasons

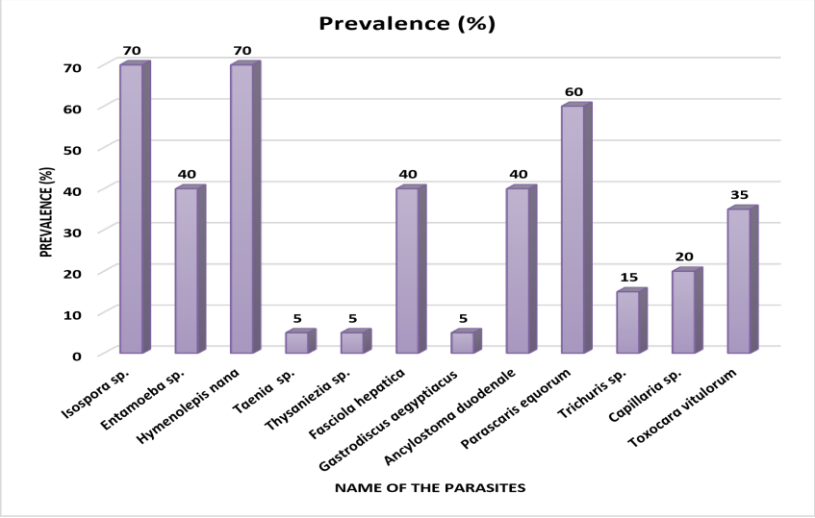


Fig.8. Prevalence and intensity of gastro-intestinal parasites of horse in summer season

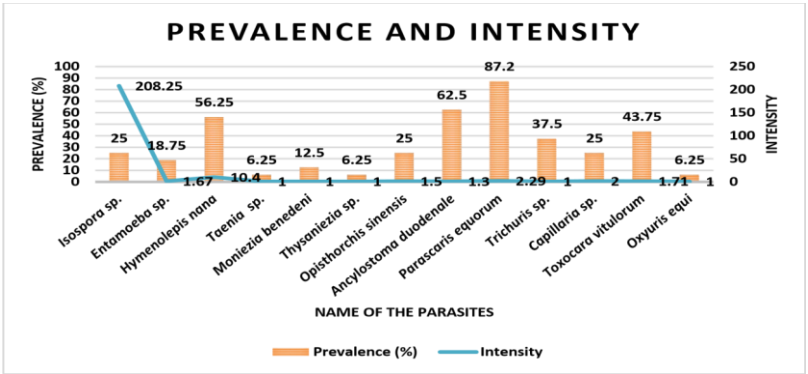


Fig. 9. Prevalence and intensity of gastro-intestinal parasites of horse in rainy season

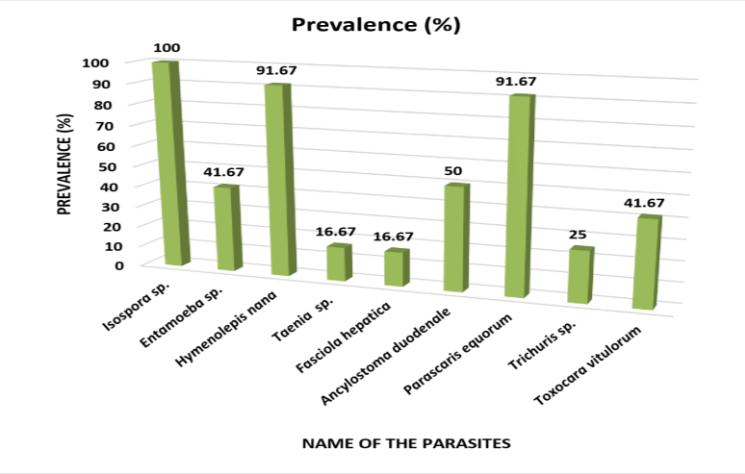


Fig.:10. Prevalence and intensity of gastro-intestinal parasites of horse in winter

statistically significant ($p = 0.0007$, $p < 0.05$). (Fig. 6). Out of 48 samples examined, 28 samples were under (9-13) years age group and 14 parasite species were found (Fig. 5). Prevalence (85.7%) was highest in case of *P. equorum* and second highest (64.3%) was for *H. nana* and *Isospora* sp. The lowest prevalence was 3.6% for *O. equi, M. benedeni* and *Thysaniezia* sp Intensity was highest in *Isospora* sp. (45±22.50) and lowest in *O. equi, M. benedeni* and *Thysaniezia* sp. (1±0.07). The prevalence of the parasite was statistically significant ($p = 0.001$, $p < 0.05$) [Fig. 5].

Prevalence and intensity of intestinal parasites in horse in relation to season: From 48 samples, 20 were collected in summer season, 16 in rainy season and 12 were in winter season. The highest prevalence was 100% recorded in rainy and winter season and lowest found in summer that was 95% (Fig. 8). In case of intensity, the highest was found in rainy season and lowest in winter where the rate of intensity was moderate in rainy season (Fig. 9).

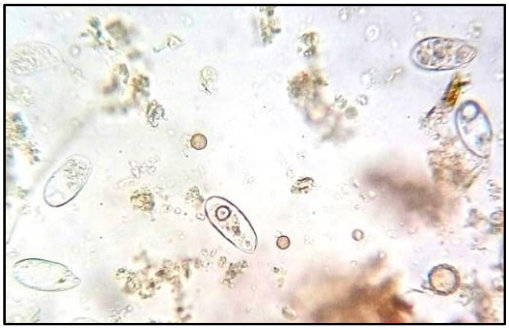
It was observed that the prevalence was highest in *Isospora* sp. and *Hymenolepis nana* and that was 70% and second highest (60%) was for *Parascaris equorum*. The lowest prevalence was 5% for *Gastrodiscus aegyptiacus,Taenia* sp. *and Thysaniezia* sp. Intensity was highest in *Isospora* sp. (57.29±34.60) and lowest in *Gastrodiscus aegyptiacus*, *Taenia* sp. *and Thysaniezia* sp. (1±0.10). The prevalence of the parasite was statistically significant ($p = 0.001$, $p < 0.05$).

The prevalence was highest in *Parascaris equorum* and that was (87.2%) and second highest (62.5%) was for *Ancylostoma duodenale.* Lowest prevalence was

6.25% for *Taenia* sp., *Thysaniezia* sp. and *Oxyuris equi*. Intensity (208.25±78.09) was highest in *Isospora* sp. and lowest (1±0.12) in *Taenia* sp., *Thysaniezia* sp. and *Oxyuris equi*. The prevalence of the parasite was statistically significant ($p = 0.001$, $p < 0.05$).

In present observation, prevalence was highest in *Isospora* sp. and that was (100 %) and second highest was 91.67 % for *Parascaris equorum* and

Eggs and cysts of gastrointestinal parasites were identified according to their taxonomy, morphology and characteristics. These are as follows.

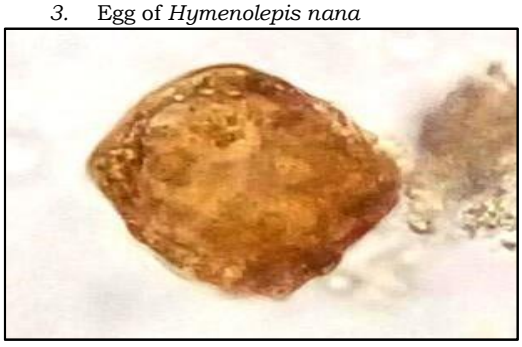


1. Cyst of *Isospora*

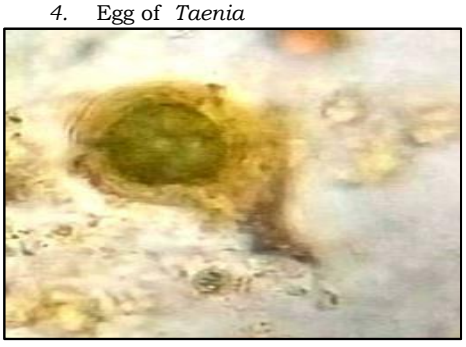
2. Cyst of *Entamoeba*

3. Egg of *Hymenolepis nana*

4. Egg of *Taenia*



5. Egg of *Moniezia benedeni*



6. Egg of *Thysaniezia* sp.

7. Egg of *Fasiola hepatica*

8. Egg of *Gastrodiscus aegyptiacus*

10.Egg of *Opisthorchis sinensis*

11.Egg of *Ancylostoma duodenale*

11. Egg of *Trichuris trichura*

12. Egg of *Capillaria sp.*

13. Egg of *Toxocara* sp

Hymenolepis nana. The lowest prevalence was 16.67 % for *Taenia* sp. and *Fasciola hepatica*. Intensity (37.83±29.17) was highest in *Isospora* sp. and lowest (1±0.28) in *Taenia* sp. The prevalence of the parasite was statistically significant ($p = 0.003$, $p < 0.05$).

Out of 48 samples 47 samples (97.92 %) were positive for gastrointestinal parasites infection. The observation of the present study is almost similar with Fikru *et al*. (2005), Sheferaw and Alemu (2015) from Ethiopia who have reported 98.2 % and 100 % prevalence respectively. This finding is much higher than the other studies done in different countries. Previous study showed 89.29 %, 84.0 %, and 86.6 % of overall prevalence by Hassan *et al.* (2005), Adeppa *et al.* (2016), Anazi and Alyousif (2011) respectively. However low prevalence was also found from previous study which was 14.43% by Sultan *et al.* (2014). Management and ecological condition could be the reason of this variation.

From this study 15 genera of gastrointestinal parasites were recorded. Among them 2 genera of protozoa (*Isospora* sp. and *Entamoeba* sp.), 4 genera of cestode (*Hymenolepis nana, Taenia* sp., *Moniezia benedeni* and *Thysaniezia* sp.), 3 genera of trematode (*Fasciola hepatica, Gastrodiscus aegyptiacus* and *Opisthorchis sinensis*) and 6 genera of nematode (*Ancylostoma duodenale*, *Parascaris equorum*, *Trichuris* sp., *Capillaria* sp., *Toxocara* sp. and *Oxyuris equi*) were found. Among different groups of parasites the highest prevalence was recorded 93.75 % in case of nematode followed by 79.2 %, 70.8 % and 31.25 % for cestode, protozoa and trematode respectively. This is in line with Matto *et al.* (2015) from Mumbai and Pune. Highest prevalence was recorded for *Parascaris equorum* (77.1 %).

Prevalence of other parasite species identified were 70.8 % in *Hymenolepis nana*, 62.5 % in *Isospora* sp., 50 % in *Ancylostoma duodenale*, 39.6 % in *Toxocara* sp., 35.4 % in *Entamoeba* sp., 25 % in *Trichuris* sp., 20.8 % in *Fasciola hepatica* 16.67 % in *Capillaria* sp., 8.3 % in *Taenia* sp. and *Opisthorchis sinensis*, 4.2 % in *Moniezia benedeni* and *Thysaniezia* sp. and 2.1 % in *Gastrodiscus aegyptiacus* and *Oxyuris equi.*

In protozoa *Isospora* sp. and *Entamoeba* sp. were recorded which is similar to the findings of Dissanayake *et al.* (2017) who recorded 13.7 % *Isospora* sp. and 28.8 % *Entamoeba* sp. This prevalence rate is much lower than current study.

In cestode group prevalence of *Hymenolepis nana* 62.5 % was highest. This was not recorded by previous researchers. Various species of beetle and fleas serve as intermediate host. Definitive hosts are human and rodents. As rodents are common in household and domesticated area horse may be infected while feeding with contaminated faeces which contains eggs of *Hymenolepis nana.*

In trematode group prevalence of *Fasciola hepatica* (16.67 %) was highest. This rate is much higher than previous records. Epe *et al.* (1993) recorded 0.2% prevalence and Epe *et al.* (2004) recorded 0.04% prevalence of *Fasciola hepatica* in Germany. Gul *et al.* (2003) recorded 0.9 % prevalence in Turkey, Uslu and Guclu (2007) recorded 3.6 % *Fasciola* sp., Umur and Acici (2009) recorded 4.82 % *Fasciola* spp. in Turkey. Prevalence of *Trichuris* sp. was 25 % which was much higher than previous finding. Uslu and Guclu (2007) recorded 0.9 % prevalence of *Trichuris* sp. in Turkey where Mezgebu *et al.* (2013) recorded 1.43 % prevalence of *Trichuris* sp. in donkey from Ethiopia.

The least prevalence was 2.1 % for *G aegyptiacus* and *Oxyuris equi*which is similar with Fikru *et al.* (2005) who reported 2.1 % prevalence in *O equi.* Least prevalence of *O. equi* was recorded by Sengupta and Yadav (1998), Anazi and Alyousif (2011), Sultan *et al.* (2014), Adeppa *et al.* (2016), Shah *et al.* (2016). Sengupta and Yadav (1998) reported low prevalence of (2.8 %) for *O. equi* in horse in Haryana, India which is almost similar with present finding. It may be due to the similarity of climatic condition. Mezgebu *et al.* (2013) reported 2.86 % *Gastrodiscus aegyptiacus* which is quite similar with present finding (2.1 %). Islam (1986) recorded 4.72 % *Gastrodiscus aegyptiacus,* Adeppa *et al.* (2016) recorded 7.14 % *Gastrodiscus aegyptiacus* in India which was higher than the present record.

However *Ancylostoma duodenale*, *Hymenolepis nana*, *Taenia* sp., *Moniezia benedeni*, *Thysaniezia* sp., *Opisthorchis sinensis*, *Capillaria* sp. and *Toxocara* sp. were encountered as new findings in present study. These parasite species are common in herbivore animals. As horse is also an herbivore animal, it may be contaminated by these parasites during feeding, lack of deworming, favourable condition for contamination and low immunity. *Moniezia benedeni*

and *Thysaniezia* sp. use oribatid mites as their intermediate host. Horse can be infected with these parasites by ingestion of infected soil mites.

Highest intensity was found in case of *Isospora* sp. (72.97±46.32) followed by *Hymenolepis nana* (8.47±5.04), *Fasciola hepatica* (4.4±1.45) and *Parascarisequorum* (2.92±1.31). Lowest intensity was found (1±0.04) in case of *Gastrodiscus aegyptiacus* and *Oxyuris equi.* The p value was 0.01, $p < 0.05$ so the prevalence rate was statistically significant for this study.

The study demonstrated 100 % prevalence in female which is higher than male prevalence 95.45 %. This is in agreement with Wosu and Udobi (2014). Sultan *et al.* (2014) reported females are highly infected than male in case of *Strongylae* spp. in Ethiopia. On the other hand Matto *et al.* (2015) reported prevalence of male equids (20.93 %) was higher than female (19.49 %). However Belay *et al.* (2016) and Taye (2017) reported that there was no statistically significant difference in prevalence of gastrointestinal parasites based on sex.

Season had a significant effect on prevalence of gastrointestinal parasites and it was statistically significant $p < 0.05$. The highest prevalence was recorded in winter and Rainy season (100 %) followed by summer (95 %). This is in agreement with Chapman (2001) who reported highest prevalence in winter season. Matto *et al.* (2015) reported 48.57 % prevalence in monsoon followed by 38.89 % in winter and 31.11 % in summer. Different findings were found by Musa *et al.* (2016) where highest prevalence was in case of summer and late autumn in Western Sudan. The prevalence of *Parascaris equorum* was highest in winter season followed by rainy and summer. Similar finding was found by Anazi and Alyousif (2011) in Saudi Arabia.

Prevalence of *Isospora* sp., *Entamoeba* sp., *Hymenolepis nana* and *Taenia* sp. was aslo found highest in winter season (Chapman *et al.* 2001). As the pregnancy period of horse lasts upto late spring it could be the reason of highest prevalence in winter season. *Opisthorchis sinensis* and *Oxyuris equi* were only found in rainy season. Prevalence of *Ancylostoma duodenale, Trichuris* sp., *Capillaria* sp. and *Toxocara* sp. was highest in rainy season. In rainy season humidity and climatic condition are favourable for development of parasitic stages. However the prevalence of *Fasciola hepatica* was recorded highest in summer season. Intensity of parasites was highest in rainy season (63.38 ±79.94) followed by summer (55.47 ±29.73) and winter (49.5 ±28.58).

Conclusion: Although horse is not considered an important livestock animal in terms of monitory benefit in Bangladesh, however parasite infestation can be a source of transmission to other livestock animals as they may share the same pasture. Captive breeding and handling of horses in captive environment should focus on cleanliness and hygiene practice of handlers because the parasites of

horses can have zoonotic importance. Control measures like antihelminth drug therapy in zoos and other horse rearing farms should be implemented.

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