

Field Evaluation of Ivermectin and Mebendazole Treatment against Gastrointestinal Parasites in Stable Horses

**Rohanizal Abdul Razak, ¹Bashir Ahmad, ²Latiffah Hassan
& ²Nur Mahiza Md Isa**

¹Department of Veterinary Clinical Studies

*²Department of Veterinary Pathology and Microbiology
Faculty of Veterinary Medicine, Universiti Putra Malaysia*

Abstract

Deworming is one of the routine healthcare in equine management especially for stable horses. Even healthy horses harbour some adult worms and eggs and the incidence of clinical and sub-clinical diseases of horses can be minimized through controlling the gastrointestinal parasites. It was the objective of this study to determine the prevalence and species of gastrointestinal parasites in stable horses in Malaysia. In this study efficacy of ivermectin and mebendazole in reducing faecal egg count (FEC) under field condition was also evaluated. Ninety-four male and female horses of mixed breed, 11.8 ± 4.36 years of age from two stables were selected in this study. Fresh faecal samples were collected at pretreatment period for initial screening and these data were used to determine the prevalence rate. Fifty more than two-year old horses with positive epg from both stables were selected for field evaluation of mebendazole and ivermectin. Commercially available mebendazole and ivermectin paste were administered orally according to manufacturer's recommended dosage, in which the pre-treatment and day 10 post-treatment epg was utilized to determine the percentage of FEC reduction. Of the 94 fecal samples, 51 (54.3%) were positive and 3(3.2%) had fecal egg count of more than 2000 epg. There are significant association ($p < 0.05$) between the age groups, sex and breeds. *Strongyloides westeri* and cyathostome were the most prevalence worm cultured. Ivermectin showed 100% reduction while mebendazole only showed 65% reduction in FEC. This study revealed that in these stables, there is low prevalence of gastrointestinal parasites. However nine species of worms were identified. The study also showed that ivermectin had greater efficacy than mebendazole in reducing FEC.

Keywords: Gastrointestinal parasites, horses, ivermectin, mebendazole, helminth species, anthelmintics

Introduction

Horses are susceptible to a variety of gastrointestinal parasites. It is well-recognized that a relationship exists between parasitic infestations of horses and the clinical signs such as spasmodic colic. General control of parasite infestation in horse care involves paddock management and chemical control using anthelmintics, fly repellents or insecticides. Deworming is one of the routine healthcares in equine management especially for stable horses. The control of parasitic helminths in domestic animals rely largely on the use of anthelmintic drugs. There are five main groups of anthelmintics namely; piperazine, benzimidazoles, imidathiazoles, salicylanilides and ivermectin.

Horse can harbor approximately 40 different species of parasites, mainly gastrointestinal parasites. Three of the main helminths are the large strongyles, small strongyles and *Strongyloides westeri* (Yazwinski, 2003; Chuah, 1987). The large strongyle, *S. vulgaris*, can cause severe damage to the anterior mesenteric artery and its branches. This will results in aneurysms, emboli and thrombi to body organs. Small strongyles (cyathostomes) will create less harmful reactions. Inflammation (catarrhal, haemorrhagic or fibrinous) of the ventral and dorsal colon may cause intestinal ulcers and possible perforation of the intestinal wall. This study was conducted to determine the prevalence of gastrointestinal parasites in stable horses and to evaluate the efficacy of ivermectin and mebendazole in reducing faecal egg count.

Materials and Methods

Horses

This study was conducted on horses from two stables in Selangor, Malaysia. The age of the horses in these stables ranged from 2 months to 21 years.

Sample

Initial screening of faecal samples was done by using quantitative analysis. All positive samples (94) were used for faecal culture. Samples from 50 horses aged more than 2 years with positive faecal egg count were selected. These samples used for the faecal egg count reduction test (FECRT).

Faecal Egg Count

The number of strongyle eggs per gram of faeces (epg) was determined by the modified McMaster technique, with the lowest detection level of 100 epg. Two grams of faecal samples were weighed in a 100 mL beaker using triple beam balance. Saturated sodium chloride (NaCl) with specific gravity of 1.2 was added to the beaker until the volume reached 60 mL. The solutions were mixed

thoroughly and filtered through plastic tea sieve into a beaker. The residues in the sieve were discarded. Using a pipette, the filtrates were stirred and just enough of the filtrates were pipetted into the counting chambers of the McMaster slide. The filtrates were stirred again and pipetted into the second counting chamber. The slides were allowed to stand for 10 sec and visualized under light microscopy and eggs counted. The calculation of epg was by the following formula:

$$\text{Ova/g faeces} = \frac{\text{Vol. of NaCl soln (60 mL)}}{2} \times \frac{\text{No. of ova}}{\text{Wt of faeces}}$$

Faecal Culture

Two medium size culture jars was ¼-filled with pooled positive pre-treatment samples and water was added to obtain a moist and crumbly consistency. The feces were loosely compacted, the jar sealed with moisten gauze, and incubated at room temperature (27 - 30°C) in the shade for 7-10 days. The third stage larvae were then collected by means of the Baermann procedure and identified. The gauze was removed and the jar was filled with lukewarm (29- 34°C) distilled water until a meniscus is formed. A petri dish was placed on the meniscus over the jar's mouth. The petri dish and jar was then inverted and filled with more distilled water (5-10 mL) allowed to stand for 30 min. The water containing the migrated larvae was then transferred into a centrifuge tube and allowed to sediment. The supernatant was discarded and the deposit stained with Lugol's iodine and examined for larvae under compound microscope. Larvae identification was made based gross morphology, number and shape of the intestinal cells (Bowman 2003; Zajac and conboy, 2006).

Treatment with anthelmintic

All horses were not treated with antihelminthics during the previous five months. Fifty horses were treated with anthelmintic as follows; Stable A (24 horses) treated with ivermectin (Bimectin®) at 0.2 mg/kg body weight; Stable B(26 horses) treated with mebendazole (Telmin Paste®) at 8.8 mg/kg body weight.

Fecal Egg Count Reduction Test

The FECRT was performed the 50 horses treated with anthelmintic. The percentage reduction in FEC was determined based on FEC before and after anthelmintic treatments, using the following formula:

$$\% \text{FECRT} = \frac{\text{Pre-treatment FEC} - \text{Post-treatment FEC}}{\text{Pretreatment FEC}} \times 100$$

Statistical analysis

Chi Square test was used to determine the significant association between the prevalence with the breeds, sex and age groups at 95% confidence level. Percentage of FEC reduction calculations were made based on arithmetic means of individual animals and compared with the parametric statistical analysis using independent *t*-test at 95% confidence interval. All statistical analysis was performed using SPSS 16.0 for Windows.

Results

Prevalence of Gastrointestinal Parasites

The modified McMaster Faecal Egg Count showed that 51 samples (54.3%) were positive. Among the four age groups, horses from age group 6-14 years showed the highest prevalence of gastrointestinal parasitism, while horses aged <2 years showed the lowest prevalence (Figure 1). Between sexes, male horses showed higher faecal egg count than females (Figure 2).

Identification of *L*₃ stage larvae

Faecal culture revealed the prevalence of 9 types of worm species in these stables (Figure 3 and Plates 1 to 5). The species identification of these larvae was made based on observation of the gross morphology of the larvae and the number and shape of the intestinal cells as previously described (Bowman, 2003; Zajac and Conboy, 2006).

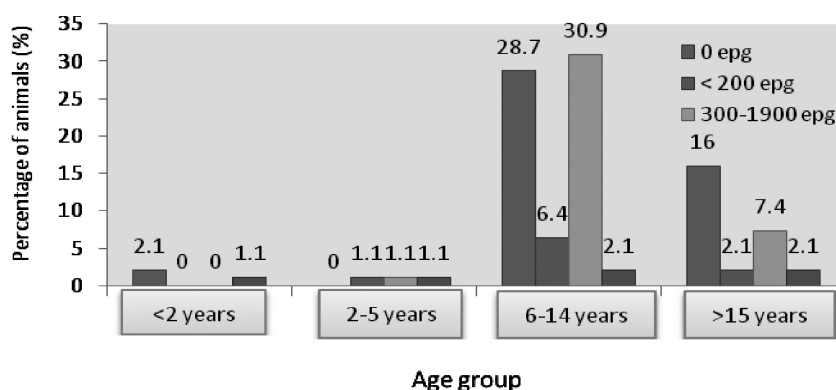


Figure 1. Faecal egg count of horses in different age groups

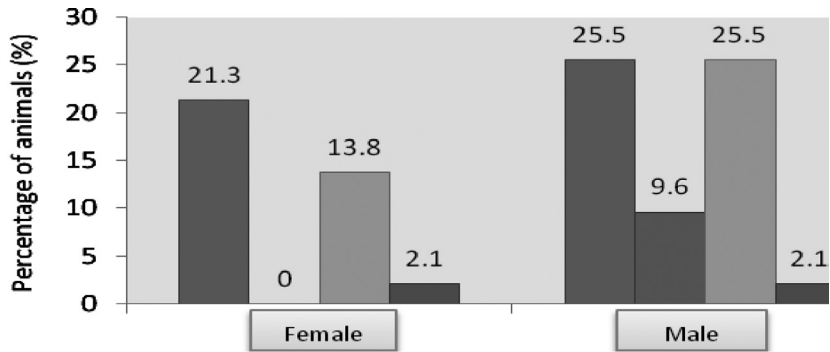


Figure 2. Faecal egg count in male and female horses

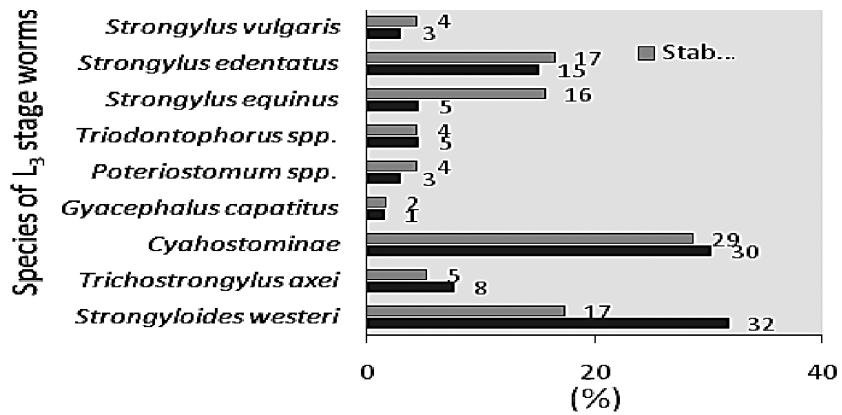


Figure 3. Prevalence of infective stage larvae in Stable A and B based on species



Plate 1. Morulated strongyle egg (arrow)

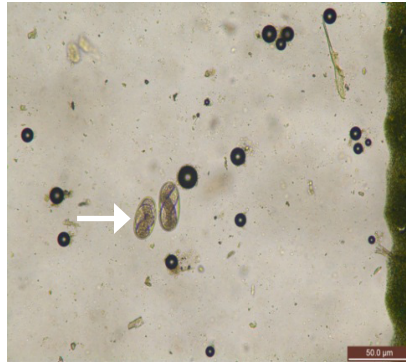


Plate 2. Larvated strongyle egg (arrow)

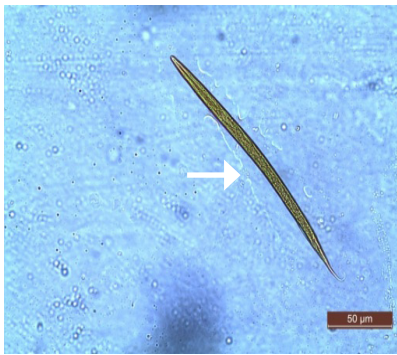


Plate 3. Infective third-stage larva *Strongyloides westeri* (arrow)



Plate 4. Infective third-stage larva of *Cyathostominae* (arrow)



Plate 5. Infective third-stage larva of *Trichostrongylus axei* (arrow)

Faecal Egg Count Reduction Test

The results from FECRT is presented in Table 1.

Horses that received ivermectin had zero epg value when examined 10 days after deworming, suggesting the efficacy of the drug was 100%, mebendazole had a significantly lower efficacy (65%) than ivermectin.

Table 1. Effect of anthelmintic treatment on faecal egg count in horses

Stable	Anthelmintic	n	mean pretreatment FEC (epg)	mean posttreatment FEC (epg)	FECR (%)
A	ivermectin	24	413	0	100
B	mebendazole	26	1246	512	65

FEC = Faecal egg count; epg = eggs/g faeces; FECR = Faecal egg count reduction
The FEC and %FECR values represent the mean at day 10 posttreatment

Discussion

Very few studies on the occurrence of gastrointestinal parasites in horses have been carried out in Malaysia. One study reported the prevalence of gastrointestinal parasites in local indigenous ponies in Kelantan was 43.97 % (Mimi, 1999). The current study in two stables showed prevalence of gastrointestinal parasites was higher in horses that had been deworming during the five month period prior to the study. However, none of these animals showed overt clinical signs, even when the FECs were high. It was also shown that there is significant association (C.I= 95%) between FEC and age groups and sex. There were 4 different breeds of horses sampled from both stables. Both stables in this study practiced deworming program for every 6 months. The management of these stables in term of hygiene, feeding, healthcare and preventive medicines is similar with proper stabling and frequent manure disposal. Young horses are more susceptible to gastrointestinal parasites than older horses and they often show high FEC prior to immunity development. It seems that the immune response is slow to develop and incomplete in most horses, regardless of the age. Thus horses tend to harbour a significant population of intestinal parasites. There was significant association between the prevalence with sex. Physiological status such as gestation and nursing period may also play a role in suppressing immune response towards the worms in mares.

Faecal cultures from each stable revealed that the two most prevalence species of gastrointestinal nematodes in horses were Cyathostominae and *Strongyloides westeri*. Generally, the majority of the gastrointestinal parasitism is dominated by small strongyle (Cyathostominae) over *Strongylus vulgaris*, *Strongylus equines* or

Strongylus edentatus. These findings were similar with other studies (Costa *et al.*, 1998; Mimi, 1999; Chuah 1987).

There are over 40 species of small strongyles with maturation periods ranging from six to twelve weeks, although it may extend to several years if their development is inhibited or arrested at L₃ stage. Consequently, in anthelmintic studies, it is preferably to use horses aged more than two years, so that the efficacy against the slower maturing small strongyles can be also determined. In this study, 100% reduction in FEC in horses at day 10 after treatment with oral ivermectin paste. However, when mebendazole was used, the FEC was only 65 % suggesting that oral ivermectin is more efficacious than mebendazole in two-year or older horses in the control of gastrointestinal parasitism.

Conclusion

The prevalence rate of gastrointestinal parasites in horses from the two stables surveyed was very low (3.2%). In these stables *Cyathostominae* spp. was most prevalence helminth. Ivermectin mebendazole is more effective in reducing FEC in stabled horses.

References

- Bowman, D.D. (2003). Helminths. In: *Georgis' Parasitology for Veterinarians*. 8thed., Saunders Elsevier Co., St.Louis, Missouri. pp. 332-334.
- Costa, B., A.J., Barbosaa, O.F., Moraesa, F.R., AcunÄab, A.H., Rochaa, U.F., Soaresa, V.E., Paulliloo, A.C. and Sanchesc, A. (1998). Comparative efficacy evaluation of moxidectin gel and ivermectin paste against internal parasites of equines in Brazil. *Vet Parasitol* **80**:29- 36.
- Chuah, C.T. (1987). A study of the equine parasitic status (gastrointestinal) of the National Stud Farm, Tanjung Rambutan, Perak. (Unpublished data).
- Mimi, M. (1999). Prevalence of gastrointestinal parasites in local indigenous ponies in state of Kelantan. (Unpublished data).
- Yazwinski, T.A., Powell, J. and Jones, S. (2003). Internal parasites of the horse. In: *Livestock Health Series*.
- Zajac, A.M. and Conboy, G.A. (2006). Fecal examination for the diagnosis of parasitism. In: *Veterinary Clinical Parasitology*. 7th ed. Blacwell Publication, Victoria Aus. pp18-25 and 98-106.