



Parascaris equorum in Horses of Payakumbuh City, West Sumatra, Indonesia

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ABSTRACT

Parascaris equorum is a species of the *Ascarididae* family which belongs to the phylum nematoda (roundworms) and is a type of parasite that affects equine health, performance, and production. The current study was carried out from April to August 2021 to determine the prevalence of equine *Parascaris equorum* in horses residing in Payakumbuh City, Indonesia. A total number of 128 fecal samples from horses were examined in the current study. Coprological examination was performed for the detection of *Parascaris equorum* eggs inside the amassed samples. The overall occurrence of *Parascaris equorum* was 14.06% (18 out of 128). The prevalence rates of sub-districts differed with the highest in East at 18.18% (8/44), followed by North, South, and West at 16.66% (6/36), 14.06% (2/22), and 7.7% (2/26), respectively. The obtained results indicated a significant difference in the prevalence rate of *Parascaris equorum* between males and females as well as those horses aged < 5 years (26.22%) and > 5 years (3%). Therefore, it is critical to not only enhance horse health management, maintenance, and health but also to provide anti-parasitic medications on a regular basis.

Keywords: Gastrointestinal nematode, Horse, *Parascaris equorum*, Prevalence

INTRODUCTION

Horse (*Equus caballus*) is a type of non-ruminant intelligent herbivorous animal that has a good learning ability to recognize an object. Horses can act as pets, sports animals, or as a means of transportation since they are easy to manage and control, and are friendly to humans. At first, horses were only used as human food. Over time, humans use horses as a means of transportation, a means of war, sports, and recreation (Parakkasi, 1999). Accordingly, the system of care and maintenance of horses have an impact on their health. The center for horse breeding in West Sumatra Province, Indonesia, is Payakumbuh City which has a higher population, compared to other regions. In addition, many diseases, such as diarrhea, can decrease body weight, growth, and endurance in horses leading to gastrointestinal parasitic infections (Andrianty, 2015). In livestock health, efforts to prevent infection caused by worms must be carried out before infection. One way to diagnose the presence of parasitic worms in livestock is by examining fresh feces to look for parasitic worm eggs. This can be performed for the early detection of parasitic worm infections, especially digestive parasites quickly, easily, and effectively (Nezar et al., 2014).

Parascaris equorum is a large horse roundworm that is the most pathogenic common disease in foals worldwide. *Parascaris equorum* infection can cause nasal discharge, coughing, stunted growth, and even death due to the obstruction of the small intestine (Boyle and Houston, 2006; Cribb et al., 2006). *Parascaris equorum* is a common nematode found in horses that can migrate from its host to the size of an adult worm (female 18-37 cm, male 15-28 cm). In older horses, infection occurs subclinically due to the presence of immunity in these nematodes. *Parascaris equorum* infection is acquired through infective eggs from environments, such as pastures or the environment around cages (Larsen et al., 2011). Studies conducted on horses in the Palestine West Bank at various ages found a prevalence rate of 15.6% for *Parascaris equorum* (Othman and Alzuheir, 2019). In addition, other studies reported the *Parascaris equorum* prevalence rates of 2%, 4%, and 1.6% for horses in East Lombok, Sumbawa, and Madura of Indonesia, respectively (Setiawan et al., 2014; Prawira et al., 2017; Apriliaiwati et al., 2019). The aim of the present study was to identify the *Parascaris equorum* horses in Payakumbuh city, West Sumatra, Indonesia. In this regard, *Parascaris equorum* is a type of parasite that affects equine health, performance, and production. The result of the present study could have an important impact on improving equine health and performance.

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MATERIALS AND METHODS

Ethical approval

All experimental protocols and procedures were approved by the Institutional Animal Care of Indonesia between April and August 2021.

Study design

Fecal samples were collected from 128 horses on a farm in Payakumbuh City 100°35" - 100°45" BT 00°10" - 00°17"LS. Sampling was carried out at 07.00-10.00 AM in each horse stable with gloved arms, and the samples were packed, labeled with the name, age, sex of the animal, and date of collection, and then transported to the Laboratory of Animal Disease and Health Agricultural State Polytechnic of Payakumbuh. It took 1-2 hours to transport samples from the collection location to the laboratory. During the transportation, samples were kept in a media cooler box equipped with an ice pack as a cooling material to keep the sample temperature below 5°C.

Direct smear approach

A small amount of overwhelmed fecal pattern (about 3 g) become blended with 10 ml of water in a beaker, and stirring was done constantly, and then a drop of this solution was put on an easy glass slide, then covered with a cowl slip. The examination was carried out under a low-energy compound microscope (Olympus, Japan) with 10× and 40× magnifications to determine the presence of any parasitic eggs or larvae in the stool samples (Yadav et al., 2014).

Flotation method

Nematode and cestode were detected using Sheather's sugar-modified flotation method (Sloss and Kemp, 1997). Therefore, 3 grams of feces were mixed with 30 ml of water until homogeneous and filtered through a tea filter. After filtering, 1-2 ml of the suspension was taken and then put into a 15 ml centrifuge tube, then Sheather's sugar was added and homogenized again by centrifugation at 1500 rpm for 4 minutes. After being centrifuged, they were lifted vertically and stored on a tube rack, and then tested for the presence of eggs.

Statistical analysis

Statistical analysis was performed using Chi-square testing statistical package for the social science (SPSS, 16.0 version, SPSS Inc., Chicago, IL). The differences in parasite prevalence were considered significant at $p < 0.05$, the assessment of risk factors to determine the association between the presence of parasites and the following variables sub-district, sex (male and female), and age (adult and colt).

RESULTS AND DISCUSSION

The results showed that the prevalence rate in each sub-district was different, the highest prevalence was in the Eastern region at 18.18% (8/44), followed by the North, South, and West at 16.66% (6/36), 14.06% (2/22), 7.70% (2/26), respectively. As presented in Table 1, the prevalence of *Parascaris equorum* in horses in Payakumbuh city was 14.06% (18/128). Based on research that has been done related to intestinal *Parascaris equorum* infestation in horses of Payakumbuh city, the impact of gastrointestinal nematode worm infection was very large, including decreased work productivity because it can cause weakness, weight loss, colic, loss of appetite, diarrhea, and even death (Hillyer, 2004). The results of Hillyer's study indicated that *Parascaris equorum* was found in horses of various ages and sexes in all sub-districts in Payakumbuh City. The highest infection rate was detected in East and North sub-districts with horse breeding centers in Payakumbuh City. These regions have the highest horse population, compared to other sub-districts.

The prevalence of *Parascaris equorum* in horses in Payakumbuh city, Indonesia, was lower than in Palestine at 15.6% (Othman and Alzuheir, 2019), Italy at 35.8% (Scala et al., 2021), Finland at 47% (Aromaa et al., 2018), the UK at 50% (Relf et al., 2013), and Kentucky at 86% (Lyons et al., 2006). Several studies conducted in other developing countries have indicated a higher prevalence of infection. For instance, the prevalence of *Parascaris equorum* was 50% in Ethiopia (Ayele et al., 2006), 47.5% in India (Yadav et al. 2014), and 18.48% in Cameroon (Lem et al., 2012). The results of other studies from different countries indicated a wide range of prevalence rates was 16.7% in some regions of Germany (Hinne et al., 2011), and the prevalence rate was 5% in Australia and Brazil (Bucknell et al., 1995; Pereira and Vianna, 2006). Variations in prevalence are related to the number of horses in an area as well as maintenance management, feed management, health management which differ from country to country. In addition, the prevalence rate can also be influenced by climatic conditions, temperature, and humidity (Singh et al., 2012).

The prevalence rate in men was 12.50% (6/48), while the sample prevalence was 15% (12/80) in females. As can be seen in Table 2, the prevalence rate of *Parascaris equorum* infection differed significantly in male and female horses in Payakumbuh city ($p < 0.05$). Sex had a significant ($p < 0.05$) effect on the prevalence of *Parascaris equorum* in horses

which was different from that report of Othman and Alzuheir who conducted a study in West Bank Palestine and with the result that there was no significant difference in the prevalence rate of *Parascaris equorum* between male and female (Othman and Alzuheir 2019). The results of this study were in accordance with other studies in different areas; In India, the prevalence of *Parascaris equorum* in horses was higher in females (60.97%), compared to males (58.51%, Yadav et al., 2014). In Palestine, the prevalence rate was 15% in males and 16.5% in female horses (Singh et al., 2012; Othman and Alzuheir, 2019). There is no significant difference in prevalence rates between male and female horses in seven provinces of southern Poland which can be caused by the way of rearing, nutrition, and maintenance management ($p > 0.05$, Kornas et al., 2010). The mare can re-infect a nursing foal. Heavy infections of *Parascaris equorum* cause impaction and perforation leading to fatal peritonitis (Tayer, 2008).

Furthermore, the obtained results showed that there was a significant difference ($p < 0.05$) in the prevalence rate of *Parascaris equorum* among horses younger than 5 years (26.22%) and in horses older than 5 years (3%, Table 3). The results of this study were similar to those reported by Chemedo et al. (2016) on horses in Around Ambo Town, Central Ethiopia indicating a significant variation with the prevalence of young horses at 60%, compared to 25.9% in older horses. The high prevalence of *Parascaris equorum* in young horses is due to the fact that immunity has not been formed completely so as the horses grow older, the level of immunity increases (Mahfooz et al., 2008; Tayer, 2008). Infection with worm parasites from different groups can result in a high level of morbidity and mortality in horses (Hodgkinson, 2006).

Table 1. The prevalence rate of *Parascaris equorum* in Payakumbuh city, West Sumatra, Indonesia

Sub-district	Sample analyzed (N)	Positive sample (N)	Prevalence rate (%)
West	26	2	7.7
East	44	8	18.18
North	36	6	16.66
South	22	2	9.1
Total	128	18	14.06

Table 2. The prevalence rate of *Parascaris equorum* in native horses based on sex in Payakumbuh city, West Sumatra, Indonesia

Sex	Sample analyzed (N)	Positive sample (N)	Prevalence rate (%)
Male	48	6	12.5 ^a
Female	80	12	15 ^b
Total	120	18	14.06

^{a-b}: Different superscript letters mean significance level at $p < 0.05$.

Table 3. The prevalence rates of *Parascaris equorum* in native horses based on the age in Payakumbuh city, West Sumatra, Indonesia

Age	Sample analyzed (N)	Positive sample (N)	Prevalence rate (%)
<5 years	61	16	26.22 ^a
>5 years	67	2	3 ^b
Total	128	18	14.06

^{a-b}: Different superscript letters mean significance level at $p < 0.05$.

CONCLUSION

The helminthiasis in the gastrointestinal tract of horses in Payakumbuh city, West Sumatra, Indonesia is influenced by sex and age factors. Therefore, the findings of this study necessitate improvement in health management, maintenance, and health condition of horses leading to enhanced health and welfare status. Further studies are needed to show other effective risk factors related to *Parascaris equorum* infestation in horses.

DECLARATIONS

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Authors' contribution

Engki Zelpina, Sujatmiko, Prima Silvia Noor, and Delli Lefiana designed this research. Collection and analysis of laboratory samples were done by Sujatmiko, Prima Silvia Noor, and Delli Lefiana. Engki Zelpina performed the statistical analysis and wrote the draft of the manuscript. The authors reviewed and approved the final draft of the manuscript prior to submission to the present Journal.

Competing interests

The authors have not declared any competing interests.

Ethical considerations

Authors have been checked ethical issues associated with plagiarism, approval to publish, error in fabrication, double publication, and submission.

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