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PREVALENCE OF GASTRO-INTESTINAL PARASITES OF HORSE (EQUUS CABALLUS LINNAEUS, 1758) IN SEVEN VILLAGE DEVELOPMENT COMMITTEE OF RUKUM DISTRICT, NEPAL

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ABSTRACT
This study aimed to determine the prevalence of gastro-intestinal parasites of horse in seven Village Development Committee (VDC) of Rukum district. It was carried out from March to November 2016. A total of 105 fecal samples of horses (79 males and 26 females) were collected by using opportunistic random method. The collected fecal samples were preserved in 2.5% potassium dichromate and microscopically examined using concentration techniques. The overall prevalence of gastro-intestinal parasites was 84.76% (89/105). The total number of genera observed during fecal examination was 12. Among them, Strongylus sp. showed the highest prevalence (51.42%) followed by Eimeria sp. (20%), Trichostrongylus sp. (14.28%), Trichonema sp. (13.33%), Parascaris equorum (10.47%), Balantidium sp. (9.52%), Dictyocaulus sp. (8.57%), Triodontophorus sp. (7.61%), Gastrodiscus sp. (6.66%), Oxyuris equi (4.76%), Entamoeba sp. (3.80%), Shistosoma sp. (1.90%) and unidentified nematode larvae (7.61%). Three genera of parasites; Shistosoma sp., Triodontophorus sp. and Dictyocaulus sp. have been reported for the first time in horses of Nepal. Present study showed higher infection rate in females (92.30%) than in male horses (82.27%). No significant association was observed between the prevalence of parasite rate with VDC ($\chi^2 = 5.7161; p>0.05$) and sex of animals ($\chi^2 = 0.3346; p>0.05$).

Keywords: Gastro-intestinal parasites, Horse, Fecal concentration, Strongylus, Dictyocaulus sp.

INTRODUCTION
Horses are prone to infestation by a mixture of internal and external parasites. They can harbor a great number of parasites without exhibiting any clinical signs (Claire & Masterson, 1987; Martin et al., 2007; Khan et al., 2015). More than 50,000 horses/asses population have been reported from 51 districts of Nepal with around 2000 horses/asses from Rukum district (SIONA 2013/14). Horses are exposed to various types of gastro-intestinal parasites resulting in significant morbidity and mortality (Hodgkinson, 2006; Goraya et al., 2013; Tilahun et al., 2014). Mortality of equines has been frequently associated with strongyles, tapeworms, ascarids, trypanosomes and Babesia sp. (Hodgkinson, 2006; Goraya et al., 2013; Tilahun et al., 2014). Research on gastro-intestinal parasites of horses/asses of Rukum district have not been done till date. Hence, present study was undertaken to determine the prevalence of gastrointestinal parasites in horses in seven eastern VDCs (Mahat, Morawang, Kankri, Kol, Taksera, Hukam and Ranmamaikot) of Rukum district, Nepal.

MATERIALS AND METHODS
The study areas selected were Mahat, Morawang, Kankri, Kol, Taksera, Hukam and Ramnamaikot, which are situated in the eastern part of Rukum district. They are located at the distance between 58 km to 125 km from headquarter of Rukum. The altitude of study area varies from 1,000 m to 4,000 m above sea level and has subtropical to subalpine climate. (Thapa, 2012; Lillesø et al., 2005). The opportunistic random sampling study was conducted during March to November 2016. A total of 105 fecal samples of horses (79 from males and 26 from females) were collected from eastern seven VDCs of Rukum district. The fecal samples were...
preserved in 2.5% potassium dichromate and packed in polythene bag having normal atmospheric temperature and transported to the laboratory of Central Department of Zoology, Kirtipur, Kathmandu. The fecal samples were subjected to the coprological examination by concentration technique (Floatation and Sedimentation). Approximately 3 gram of fecal sample was placed in a beaker with 42 ml of water and filtered. The filtrate solution was centrifuged for 5 minutes. The filtrate was saturated with NaCl and again centrifuged. The top mixture was examined by adding methylene blue and the sediment was stain with iodine solution to detect eggs, trophozoites and cysts of parasites. (Soulsby, 1982; Zajac & Conboy, 2012). The collected data were coded and entered into Microsoft Excel spread sheet. Data were statistically analyzed using Pearson’s Chi-square test with Yates continuity correction, performed by “R”, version 3.3.1 software packages.

RESULTS

Overall prevalence of gastro-intestinal parasites in horse

Out of 105 samples, 89 (84.76%) samples were found to be positive for parasitic egg, cyst and larvae. Among them, the Strongylus sp. showed the highest prevalence (51.42%) followed by Eimeria sp. (20%), Trichostrongylus sp. (14.28%), Trichonema sp. (13.33%), Parascaris equorum (10.47%), Balantidium sp. (9.52%), Dictyocaulus sp. (8.57%), Triodontophorus sp. (7.61%), Gastrodiscus sp. (6.66%), Oxyuris equi (4.76%), Entamoeba sp. (3.80%), Shistosoma sp. (1.90%) and unidentified nematode larvae (7.61%).

![Fig. 1. Prevalence of GI parasites of Horses.](image)

VDC-wise prevalence of GI parasites in horses

The highest prevalence (100%) was revealed in Kankri VDC followed by Rammamaikut (96.42%), Kol (90%), Taksera (85.71%), Hukam (80%), Morawang (77.77%) and Mahat (64.70%). The study showed effects of VDCs (study areas) on the prevalence of gastro-intestinal parasite was not statistically significant ($\chi^2 = 5.7161; p>0.05$).

![Fig. 2. Overall sex-wise prevalence of GI parasites in horses.](image)

Prevalence of GI parasites in horses: Sex wise

Out of 105 horse samples collected, 79 were males and 26 were females. Sex-wise 65 males (82.27%) and 24 females (92.30%) were found to be positive. The study shows higher prevalence of gastro-intestinal parasite infection in females but, there the difference was not statistical significant ($\chi^2 = 0.3346; p>0.05$).

Type of GI parasites infection in horses

Figure 3 describes infection status of GI parasites in horses. According to study the highest prevalence rate (42.85%) was noted for double infection followed by single (27.61%), triple (10.47%) and multiple (3.80%) but, there was no statistical significance in the difference among infection status ($\chi^2 = 84.277; p<0.05$).
Prevalence of Gastro-Intestinal Parasites of Horse...

DISCUSSION

In the present study, the prevalence of gastro-intestinal parasites of horses (Equus caballus) has been carried out for the first time from Rukum district. The prevalence of gastro-intestinal parasites in the horses in Rukum was 84.76%. The high prevalence observed in this study agrees with the works of Aypak and BerGu (2013), Adeppa et al. (2014), Mezgebu et al. (2013), Sultan et al. (2014) and Wosu and Udobi (2014), who reported 88.6%, 84%, 92.71%, 75.62% and 76.1% in Aydin region of Torkey, Schimoga of Karnataka, Gondar town, Kurfa Chale Ethiopia, North Darfun, South Wolla Ethiopia, Jabalpur of North Indea, Hawassa town, Mekelle Region, Kombolchu town, Menzkeya Gerbil district and Warmin of Mazury respectively. The high prevalence of infection in horses (84.76%) observed in the present study is lower than Wannas et al. (2012), Tilahun et al. (2014) and Hassan (2014), who reported 100%, 97.9% and 100% in Aldiwniyah Governate, Hawassa town and Baquba city respectively and higher than Saeed et al. (2010), Adam et al. (2013), Regassa and Yimer (2013), Yadav et al. (2014), Tesfu et al. (2014), Shiret and Samuel (2015), Samuel et al. (2015), Molla et al. (2015) and Sokol et al. (2015), who reported 65.1%, 24.6%, 60.68%, 59.25%, 63.7%, 59.3%, 55.7%, 69% and 51.7% in Kurfa Chale of Ethiopia, North Darfun, South Wolla Ethiopia, Jabalpur of North Indea, Hawassa town, Mekelle Region, Kombolchu town, Menzkeya Gerbil district and Warmia of Mazury respectively. The high prevalence rate of present study could be due to samples collection during spring because eggs excretion during spring and summer season was high (Saeed et al., 2010; Nielsen, 2012). The high prevalence rate (84.76%) of present study is also characterized by poor husbandry practice of the study area (Adebabay, 2009; Sisay et al., 2007; Mezgebu et al., 2013; Adeppa et al., 2014). The differences among these findings from different regions might be due to variation in management system, geo-graphical climatic condition, sample size, sample collection period and sampling method differences (Wannas et al., 2012; Tilahun et al., 2014; Yadav et al., 2014).

The prevalence rate variations in the present study from seven VDCs could be mainly due to altitudinal variations and habitat variations in their respective VDCs. We found that highland of cooler region and habitat near river or water source had higher prevalence than lowland (Courtney, 1999; Holland et al., 2001). The highest prevalence of Strongylus sp. was 51.42% in the current study which is in close agreement with works of Wosu and Udobi (2014), Adeppa et al. (2014) and Poudel (2007), who reported 55.3%, 52.38% and 48.78% in North Nigeria, Schimoga Kornataka and Sainik stud farm of Chitwan respectively but was lower than Nigeria (68.8%) by Umar et al. (2013) and higher than Baquba city (44%) by Hassan (2014). The prevalence of Trichonema sp. was 13.33% which is similar to 17.07% recorded by Poudel (2007) from Bharatpur, Chitwan. The prevalence of Triodontophorus sp. (7.61%) reported in the present study is close to 11% (Sapkota, 2009) but was lower than 33.2% (Tilahun et al., 2014). The prevalence (6.66%) of Gastroduiscus sp. reported in the present study is in close agreement with 7.14% (Adeppa et al., 2014), 7.31% (Poudel, 2007), 6% (Karki & Manandhar, 2006) from Schimoga of Kornataka, Chitwan and Udyapur district respectively. The Shistosoma sp. was reported for the first time in horse from Nepal. The prevalence (1.90%) of Shistosoma sp. reported in present study agrees with 0.31% (Matto et al., 2015) from Mumbai and Pune India. The prevalence of Trichostrangylus sp. in horses was found 14.28%. Trichostrangylus sp. reported in the present study was very less than finding of Poudel (2007) who reported 80.48% from Bharatpur, Chitwan. The prevalence rate of Parascaris equorum is (10.47%) almost similar to 10.71% (Adeppa et al., 2014), 7.9% (Kornas et al., 2010), 6.3% (Umar et al.,

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![Fig. 3. Overall infection status of GI parasites in horses.](image-url)
2013), 13.9% (Ionita et al., 2013) and 15.51% (Sultan et al., 2014) but lower than 40.90% (Wannas et al., 2012), 43.8% (Mezgebu et al., 2013) 18.75% (Yadav et al., 2014), 26.2% (Tesfu et al., 2014), 55.8% (Tilahun et al., 2014) and was higher than 4.5% (Regassa & Yimer, 2013), 3.9% (Hasson, 2014), 1.8% (Shiret & Samuel, 2015), 4.7% (Samuel et al., 2015) and 5% (Tiroshlevy et al., 2015). The lower prevalence of Parascaris equorum in the present study could be due to collection of fecal samples from adult working horses with only few from young horses. P. equorum mainly occurs in young horses less than 3 years old and infection with this parasite is restricted to animals less than 5 years old (Bucknell et al., 1995). The prevalence of Oxyuris equi was 4.76% in horses.

This result is similar with Regassa and Yimer (2013), Adeppa et al. (2014), Mezgebu et al. (2013) and Sultan et al. (2014) who reported 4%, 4.7%, 0.95% and 1.47% respectively. But, lower than the results of Wannas et al. (2012), Umar et al. (2013), Wosu and Udobi (2014) and Tilahun et al. (2014) who reported 11.36%, 27.1%, 30.2% and 34.2% respectively. The lower result (4.76%) of Oxyuris equi in present study might be due to low temperature and collection methods because samples were not collected directly from rectum. Similarly, Dictyocaulus sp. was reported for the first time from horse in Nepal. The prevalence of 8.57% of Dictyocaulus sp. was recorded in the present study, which is similar to the report of Umar et al. (2013), who reported 10.4% in Nigeria but, was higher than 3.7% (Tilahun et al., 2014) and 2.5% (Saeed et al., 2010). The prevalence rate of Balantidium sp. (9.52%) is nearly similar to 15.90% (Wannas et al., 2012) in Al Diwaniyah Governorate. The prevalence of 20% of Eimeria sp. was recorded in the present study, which is higher than the reports of Wannas et al. (2012), Alharis (2001). Besides, we also found that there was no significant association (γ2 = 0.3346; p>0.05) of parasitic prevalence between male and female horse, which was estimated 82.27% and 92.30% respectively. The finding of this type of result was reported by Saeed et al. (2010), Mezgebu et al. (2013). But opposite result was reported by Umar et al. (2013) and Hasson (2014). In the current study, mixed infection was detected in 57.14% of horses which is almost similar with the finding of Tolossa and Ashenafi (2013) in horses of Arsi-Bale highlands of Oromiya region and Uslu and Guclu (2007) in Turkey, who reported 59.1% and 50% respectively.

In the present study area, most of the respondents were found to be not enough qualified for management of equines. Most of them used river water source for equines which made the horses vulnerable to different parasitic infections.

CONCLUSION AND RECOMMENDATIONS

The present study shows that horses in Rukum district have mixed parasite infection. The horses were found to be susceptible to various GI parasites. Management practices and geographical differences can be considered as the important factors which influence the prevalence of GI parasites. Veterinary health program and appropriate prevention and control strategy actions supported by both government as well as private sector is necessary to minimize the gastro-intestinal parasites of horses.

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