

Prevalence of Gastro Intestinal Parasites in Working Equids of Tamil Nadu, India

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Abstract

The study was conducted from April 2023 to September 2023 in twelve locations of Tamil Nadu to find out the prevalence of gastro intestinal parasites and assess the associated risk factors in working equids. A total of 179 faecal samples were collected randomly from equines (40 Horses, 63 Ponies and 76 Donkeys) and examined using standard coprological techniques. The overall prevalence rate of gastrointestinal parasites was found to be 41.34 per cent with an incidence rate of 44.44 per cent, 40.00 per cent and 39.47 per cent in ponies, horses and donkeys respectively. The prevalence of strongyle infection was found to be highest (28.49%) followed by mixed infection of Strongyle species with *Parascaris equorum* (5.59 %) and others. Among the risk factors assessed, the parameter *viz.* body condition score (BCS) was strongly associated ($p < 0.0001$), while the factors such as housing condition ($p = 0.0391$) and terrain ($p = 0.020$) had a significant association with prevalence rate.

The horses, ponies, donkeys and mules which are used for draught purpose and as pack animals are grouped as working equids

(Delphine, 2015). Working equids, popularly called as *beast of burden* also plays a major role in the livelihood of poorest of poor. Working equids are predominant in developing countries where they are mostly used for packing and carting (Gelaye and Fesseha, 2020). In India, 98 per cent of equines contribute to the employment and income of poor farmers and landless labourers who mostly rely on livestock in the unorganised sector (Yash *et al.*, 2019). In India, the working equids are mostly used for transport of goods, farming and recreational purposes. Gastro intestinal parasites are very common in equids and pose a serious challenge to health and welfare issues of the equids worldwide (Kaur *et al.*, 2018). The parasitic infection not only leads to weight loss and reduced work performance but also decrease the immunity of the host predisposing it to other diseases.

Studies were available from different parts of our country regarding the prevalence rate of gastro intestinal parasites in equids and have reported prevalence ranging from 19.06 per cent to 77.14 per cent (Sengupta and Yadav, 2003; Yadav *et al.*, 2014; Sathiyamoorthy *et al.*, 2016; Singh *et al.*, 2016; Kaur *et al.*, 2018; Ajabe *et al.*, 2020; Devkota *et al.*, 2021 and Nagar *et al.*, 2022). But with regard to Tamil Nadu, a holistic study on the prevalence of gastro intestinal parasites in working equids is scanty. Hence in the present study, an attempt was made to assess the prevalence of gastro intestinal parasites and associated risk factors among working equids in Tamil Nadu.

Key words: Strongyles, gastro intestinal parasites, working equids, coastal terrain

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Materials and Methods

A cross-sectional study was conducted from April 2023 to September 2023 to assess the prevalence and type of gastro intestinal tract (GIT) parasites and to find out the relationship between parasitic load and potential risk factors in the study area. Working equids in the study locations were chosen at random for GIT parasite investigations, regardless of their age, sex, body condition, or color. Twelve locations in Tamil Nadu namely Udangudi, Nagore, Palani, Panaikadu, Ooty, Mettupalayam, Chennai, Bodi, Malaiyur, Rameshwaram, Krishnagiri and Vellore which were high in working equid population were purposively selected for the study. A total of 179 working equids (40 Horses, 63 Ponies and 76 Donkeys) were included randomly for the study.

Factors such as species, sex, age, Body Condition Score (BCS), terrain, work type and housing condition were considered. The study included horses, ponies and donkeys of all age groups and both sexes which were used as pack animals for transporting goods from one place to other, used in pulling carts and for riding purpose in tourist spots. The age of the selected working equids were determined by dentition characteristics and grouped into three categories *viz.* Young (< 5 years), Adult (5-10 years) and Old (> 10 years) following Fesseha *et al.* (2022). Body Condition Scoring (BCS) of the horses, ponies and donkeys were estimated based on the guides described by Elisabeth (2008) and Mathewos *et al.* (2021).

Faecal samples were collected randomly from each horse, pony and donkey using disposable gloves and stored in the plastic bottles and labelled with identification number, age, sex and samples were sent to the department of Veterinary Parasitology, Madras Veterinary College, Chennai for further processing and identification of parasitic eggs/ oocysts. The faecal samples were subjected to standard coprological examination using direct smear, sedimentation and floatation techniques and examined under microscope using 10x and 40x magnification. The prevalence was calculated as the number of animals having parasites, divided by the total number of animals examined and

multiplied by 100.

Statistical analysis

The association between the risk factors and the outcome variables was assessed using chi-square (X^2) test (Mathewos *et al.*, *loc cit.*).

Results and Discussion

Overall prevalence

The species wise prevalence of gastro intestinal parasites in working equids in the study area is presented in the Table I. It could be inferred from the Table I that the overall prevalence of GIT parasites in working equids in the study area was 41.34 per cent. This is in accordance with Ajabe *et al.* (*loc cit.*) who reported 44.37 per cent in Maharashtra, India. This finding was lower as compared to the reports of Uslu and Guclu (2007) who reported 100 per cent in horses and donkeys of Turkey, Yadav *et al.* (*loc cit.*) who reported 59.25 per cent in horses of Jabalpur region, Madhya Pradesh, Sathiyamoorthy *et al.* (*loc cit.*) who reported 77.14 per cent in donkeys of Theni district, Tamil Nadu and Mathewos *et al.* (*loc cit.*) who reported 78.50 per cent in horses and donkeys of Hawassa district, Southern Ethiopia. In the recent past, government and non government institutions were working for the betterment of working equids in Tamil Nadu who had periodically dewormed the animals and it might be the reason for lower incidence of GIT parasites in working equids in the study area. But if the efforts of various institutions functioning towards the betterment of the working equids were coordinated, the prevalence rate of GIT parasites in these animals could be minimized in future.

The prevalence of GIT parasites in horses, donkeys and ponies was 40.00 per cent, 39.47 per cent and 44.44 per cent respectively. There was no significant difference ($p=0.823$) in the incidence of GIT parasitic infection among the species *viz.* horses, donkeys and ponies. Though the difference was not significant, the prevalence rate was comparatively high in ponies followed by horses and donkeys. This is in contradictory with Mezgebu *et al.* (2013) who reported higher gastro intestinal parasites in donkeys (97.13 %) than in horses (80.95%)

Table I: Species wise prevalence of gastrointestinal parasites in working equids

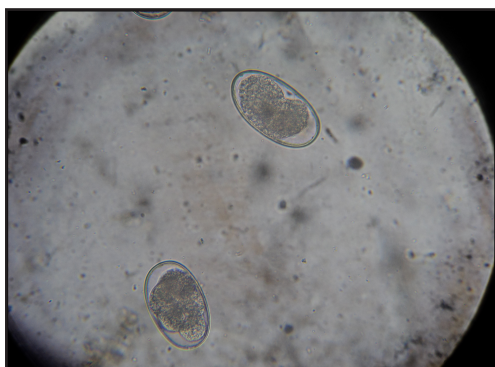
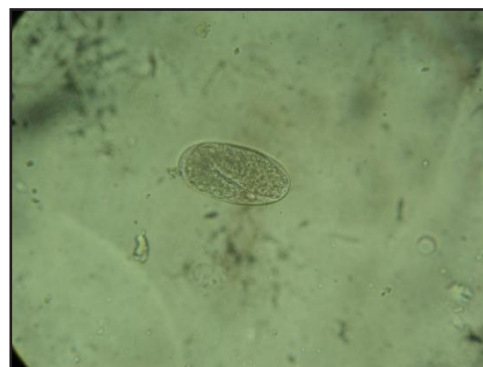
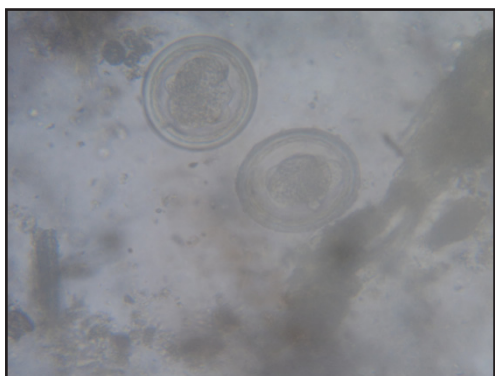
Species	Number examined	Positive	Negative	Prevalence percent	Chi square value	p value
Horses	40	16	24	40.00	0.39	0.823
Donkeys	76	30	46	39.47		
Ponies	63	28	35	44.44		
Total	179	74	105	41.34		

in Gondar town, Ethiopia, Singh *et al.* (*loc cit.*) in mules (42.14 %) than in horses (17.90 %) in Punjab, Khan *et al.* (2017) in donkeys (92.8%) than in horses (78.3%) in Pakistan, Mathewos *et al.* (*loc cit.*) in donkeys (92%) than in horses (63%) in Hawassa district of southern Ethiopia. Whereas, Sengupta and Yadav (*loc cit.*) reported that the GIT parasitic infection was predominantly present in horses (61.62%) followed by donkeys (50.00%) and mules (47.14%) in hilly pockets of western Himalayas.

Species of gastro intestinal parasites identified from working equids

The identified gastro intestinal parasites were

Strongyles, *Strongyloides* species, *Parascaris equorum* and Oocyst of *Eimeria* species in the working equids of the study area (Fig. 1- 4). The distribution of species of gastro intestinal parasites identified from working equids were shown in Table II. In the present study, Strongyle infection was found to be highest (28.49%) that is congruent with the findings of Adeppa *et al.* (2016) who reported 52.38 per cent Strongyle infection in horses at Shimoga region, Karnataka, Singh *et al.* (*loc cit.*) who reported 17.90 % in equines from central plain zone, Punjab and Kaur *et al.* (*loc cit.*) who reported 12.06 % in horses at Southern Punjab district, India. This finding is in contradictory with Sathiyamoorthy

**Fig.1** Egg of *Strongyle* species (10x)**Fig.2** Egg of *Strongyloides* species (10x)**Fig.3** Egg of *Parascaris equorum* (40x)**Fig.4** Oocyst of *Eimeria* species (40x)

et al. (loc cit.) who divulged that the incidence of *Parascaris* sp (74.07%) was highest in donkeys followed by *Strongyles* sp (40.74%) in Theni district, Tamil Nadu.

The incidence of *Strongyloides* species was reported in donkeys (7.89%) alone. On the other hand, the mixed infection of *Strongyles* species and *Parascaris equorum* was 5.59 per cent in working equids and in specific comparatively high in donkeys (6.58%). The mixed infection of *Strongyles* species, *Parascaris equorum* and oocyst of *Eimeria* species was comparatively highest in horses (7.50%) than that of ponies and donkeys in the study area. Kaur *et al. (loc cit.)* reported 12.06% *Strongyle* sp., 2.72% *Parascaris equorum*, 1.56% mixed infection (*Strongyloides westeri* and *strongyle* sp.), 1.56% amphistomes, 0.78% *Eimeria* sp. and 0.38% *Trichuris* sp. prevalence in horses of Southern Punjab districts.

Risk factors associated with the prevalence of GIT parasites in working equids

The association between the prevalence of GIT parasites in working equids and risk factors were presented in Table III. The incidence of GIT parasites was high in young animals (< 5 years) than medium and old aged animals, but the difference among age group was not statistically significant ($p=0.5785$). The high prevalence in young animals might be due to the lower immunity at young age and development of resistance in old animals. Moreover, the farmers were more hesitant to deworm the young animal than old animal. This finding is in accordance with Singh *et al. (loc cit.)* and Kaur *et al. (loc*

cit.). It could be inferred from the Table III that both female and male working equids were equally susceptible to GIT parasitic infection. This is in agreement with Pilania *et al. (2013)*, Tesfu *et al. (2014)* and Singh *et al. (loc cit.)* who reported that the sex of the host had no significant effect on prevalence of strongyle infection in equines. Ajabe *et al. (loc cit.)* reported that the sex-wise prevalence was more in male donkeys as compared to female donkeys.

The working equids with poor body condition score (76.19 %) had higher prevalence rate than good conditioned animals (22.67%) and the difference was found highly significant ($p<0.0001$) (Mathewos *et al., loc cit.* & Fesseha *et al., loc cit.*). The body condition score reflected the nutrition and immune status of the host and was a good indicator of parasitic burden, which could be used by farmers to identify donkeys with the immediate requirement of anti helminthic remedies (Ayele *et al., 2006* & Fesseha *et al., loc cit.*).

In the present study, the good housing condition referred to the provision of pucca shed/ kutcha shed/ natural shade like trees and environment conducive to exhibit five freedoms of animal welfare (Farm Animal Welfare Council (1979)). It could be inferred from the Table III that, the working equids maintained under good housing conditions harbored significantly ($p=0.0391$) lower level of GIT parasitic infection than the animals which are maintained under poor housing conditions. The housing condition had direct impact on overall wellness of the animals and immune status which was reflected

Table II: Distribution of species of gastro intestinal parasites identified from working equids

Parasites species	Horse (n=40)		Ponies (n=63)		Donkeys(n=76)		Overall(n=179)	
	Positive	%	Positive	%	Positive	%	Positive	%
Strongyle species	10	25.00	23	36.51	18	23.68	51	28.49
<i>Strongyloides</i> species	0	0.00	0	0.00	6	07.89	6	03.35
Strongyle species + <i>Parascaris equorum</i>	2	05.00	3	04.76	5	06.58	10	05.59
Strongyle species +Oocyst of <i>Eimeria</i>	1	02.50	0	0.00	1	01.32	2	01.12
Strongyle species + <i>Parascaris equorum</i> + Oocyst of <i>Eimeria</i>	3	07.50	2	03.17	0	00.00	5	02.79

Table III: Prevalence of GIT parasites in association with risk factors of working equids

Risk factors	Number examined	Positive	prevalence percent	Chi square value	p value
Age					
<5 years	49	23	46.94		
5 - 10 years	68	28	41.18	1.10	0.5785
>10 years	62	23	37.10		
Sex					
Male	98	40	40.82		
Female	81	34	41.98	0.03	0.8754
Body Condition Score					
Good	75	17	22.67		
Medium	62	25	40.32	31.84**	<0.0001
Poor	42	32	76.19		
Housing condition					
Poor	71	36	50.70		
Good	108	38	35.19	4.26*	0.0391
Work type					
Transport goods by packing	111	45	40.54		
Transport people by cart	16	6	37.50	0.09	0.956
Riding purpose in tourist spots	52	23	44.23		
Terrain					
Coastal plains	51	28	54.90		
Hilly terrain	128	46	35.94	5.41*	0.020
Total	179	74	41.34		

** Statistically highly significant at 1% level

* Statistically significant at 5% level

in the result. Thus, it is the high time to sensitize rearers in the study area on importance of providing good housing condition to the working equids, so that the parasitic infection could be minimized.

The prevalence of GIT parasitic infection was comparatively higher in equids used for riding purpose in tourist spots (44.23 %) than that of other work types though the difference was found statistically not significant ($p=0.956$). The working equids used for riding purpose in the study area were housed in a common place which was more congested leading to the ingestion of oocysts and eggs from the soil and it might be the reason for high prevalence rate. In contrary, Khan *et al.* (*loc cit.*) reported that highest parasitic infection was observed in the animals that transport goods from one place to

other than that of other work types.

Further, it was found that the incidence of GIT parasitic infection was significantly high ($p=0.020$) in working equids reared in coastal plains (54.90 %) than that of hilly terrain (35.94 %). The work load, unavailability of nutritious green fodder, congested housing might be the reasons for high prevalence rate in the coastal plains. Froeschke *et al.* (2010) found a significant positive correlation between mean annual precipitation (rainfall and relative humidity) and nematode infestation rates of animals and a negative correlation with temperature. In addition, they found associations between precipitation and different qualitative measurements of parasite burden. Thus, further research is to be stirred up to assess the impact of coastal climate on the parasitic infection in equids.

The working equids in the study area were maintained under extensive grazing system with minimum supplement of bran. The working equid rearers were unaware of importance of rotational grazing in preventing GIT parasitic infection in working equids. The unrestricted use of single dewormer for a long period might result in drug resistance among parasites. Thus, imparting knowledge on importance of scientific deworming schedule and rotational grazing among the working equid rearers in Tamil Nadu is the need of the hour. Hernández *et al.* (2018) recommended that supplementation twice weekly with pellets industrially manufactured with the spores of *Mucor circinelloides* and *Duddingtonia flagrans* ensures the presence of these two parasitocidal fungi in the feces, which can reduce the development of strongyles in the environment and thus the risk of horse infection.

Conclusion

The present study was designed to explore the risk factors associated with the prevalence of gastro intestinal parasites in working equids in the selected locations of Tamil Nadu. The overall prevalence rate of GIT parasitic infection was 41.34 per cent in working equids. Strongyle infection was found to be highest (28.49%) followed by mixed infection of Strongyle species with *Parascaris equorum* (5.59 %) and others. Among the risk factors assessed, factors such as body condition score ($p < 0.0001$), housing condition ($p = 0.0391$) and terrain ($p = 0.020$) had a statistically significant association with the prevalence rate of GIT parasites in working equids in the study area. The working equids such as horses, ponies, mules play a significant role in the livelihood of its rearers. Thus, the parasitic burden would hinder the work performance of these animals which in turn affects the livelihood of the working equid rearers. Hence, the working equid rearers need to be sensitized on the importance of deworming in working equids and the practice of rotational grazing to minimize the parasitic infection among working equids.

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