RESEARCH ARTICLE

Report on Endo- and Ecto-Parasites in Asian Elephants from Tamil Nadu, India

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Abstract

The occurrence of endo-and ecto-parasites were studied in semi-intensive reared elephants (n=26) of Theppakadu elephant camp, Mudhumalai Tiger Reserve, Tamil Nadu. Dung samples and ectoparasites were collected from the maintained elephants. Evidence of ova of Strongyle, *Strongyloides* sp., *Bivitello bilharzianairi* and mixed helminthic infections were observed. Lice collected from the ear, groin and tail regions were identified as *Haematomyzus elephantis.* Larvae of *Cobboldia elephantis* were also detected in the faecal samples. The present study emphasizes the occurrence of various endo- and ecto-parasitic infections in Asian elephants from Tamil Nadu, India.

Key words: Asian elephants, *Cobboldia, Haematomyzus,* Helminths, Tamil Nadu

Ind J Vet Sci and Biotech (2025): 10.48165/ijvsbt.21.5.10

Introduction

The Asian elephant (*Elephas maximus*) is the largest living terrestrial mammal, and its distribution extends throughout tropical South and Southeast Asia, including India, Vietnam and Sumatra (Choudhury, 1999). Domesticated and trained Indian elephants have been used for drought relief, circus shows and religious ceremonies and also as a essential part of Hindu religious temples in India, in addition to their free-living population in protected areas. According to the IUCN Red List of Threatened Species, it is classified as a 'endangered species' with an estimated population of 30,000-50,000, with India accounting for roughly 60% of the population. Elephant populations endure threats from poaching, habitat degradation, and disease outbreaks (Riddle *et al*., 2010). Elephants, like other domesticated animals, are susceptible to parasites that affect their health and activity. Almost all of these parasites are majorly found in wild counterpart. Young elephants are potentially more susceptible to these parasites and severe infestations may constitute an imminent danger to their well-being (Abhijith *et al.,* 2018). Parasitism can impact host evolution and ecology through processes like sexual selection and parasite-mediated competition, thereby reducing population number or causing extinction. However, there are limited records of parasite infections in elephants. The current paper reports the occurrence of helminthic and arthropod infections in Asian elephants from Tamil Nadu, India.

Materials and Methods

The study area includes Theppakadu elephant camp, Nilgiris district of Tamil Nadu coincides with the geographic coordinates, latitude N-11° 34'45", longitude E-76° 35'3". The minimum temperature of 14°C and maximum temperature of 33°C prevailed in this area during the study period.

A total of 26 elephant dung samples and ectoparasites from 4 elephants were collected from Theppakadu Elephant camp, Mudhumalai Tiger Reserve as a part of annual health screening programme. The samples were preserved in 70 % alcohol and transported with proper packaging to the Department of Veterinary Parasitology of the Veterinary College and Research Institute, Orathanadu for analysis.

Concentration methods of faecal examination including sedimentation and floatation (with saturated salt solution, specific gravity 1.18) were used for detection of endoparasites (Soulsby, 1982). The collected ectoparasites were subjected to sodium hydroxide digestion followed by dehydration

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How to cite this article: Elangovan, T., Murugesan, J., Murugan, J. V., Krishnamurthy, R. K., Annamalai, L., Muthusamy, V., & Rangasamy, V. (2025). Report on Endo- and Ecto-Parasites in Asian Elephants from Tamil Nadu, India. Ind J Vet Sci and Biotech, 21(5), 50-53.

Source of support: Nil

Conflict of interest: None

Submitted 21/06/2025 **Accepted** 18/07/2025 **Published** 10/09/2025

in ascending grades of alcohol and cleared in xylene for morphological identification. The collected arthropod larvae were processed as per Zumpt (1965).

Results and Discussion

Endoparasites

The faecal sedimentation technique revealed the presence of ova of a trematode *Bivitello bilharzianairi,* nematodes strongyle and *Strongyloides* sp. Egg of *Bivitello bilharzianairi* (Fig. 1) was characterized with the morphology of oval shape with a sharp spine at one end. The strongyle egg (Fig. 2) was identified based on oval, thin shell with segmented embryo, whereas the ova of *Strongyloides* sp. (Fig. 3) identified typically by the presence of first larval stage (L1) inside the egg. The incidence of these intestinal parasites is as enlisted in Table 1.

Table 1: Incidence of intestinal parasites in elephants (n=26)

Parasites		No. of positive samples	Incidence (%)
Trematode	*Bivitello bilharzianairi*	2	7.69
Nematode	*Strongyloides* sp.	2	7.69
	Strongyle	3	11.53
Mixed infection	*Bivitello bilharzianairi* + *Strongyloides* sp.	1	3.84
Total		**8**	**30.75**

In this study, the incidence of Strongyle infection was found to be highest, followed by *Bivitello bilharzianairi* and *Strongyloides* sp. These findings were consistent with the report of earlier researchers in Asian elephants (Saseendran *et al.,* 2004; Arunachalam *et al.,* 2007). Strongyles are among the more prevalent parasites, have a direct life cycle. Elephant Strongyles are likely identical to that of domestic animals (Fowler and Mikota, 2006). The high prevalence of Strongyles suggests a high risk of parasite transmission through faeces. The parasitisation by *Strongyloides* sp. had been more frequently reported in Asian elephants (Vimalraj *et al.* 2012; Abhijith *et al.,* 2018). The trematode *Bivitello bilharzianairi* is an uncommon schistosome found in Asian elephants. The adult worms of *B. nairi* are obligatory vascular parasites and they move from the mesenteric blood arteries and portal veins to the liver and spleen through the endothelial circulation. Schistosomes infection in Asian and African elephants that often remains asymptomatic. Schistosomiasis has been found in both captive and free-ranging Asian elephants throughout India, including Assam, Kerala, Tamil Nadu, Madhya Pradesh and other regions (Modi, 2001; Vimalraj *et al.* 2012). The higher prevalence of helminthic parasitic infections during the summer and early monsoon season could be attributed to the availability of ideal climatic conditions for faster hatching of eggs and rapid development to the infective stage, as described earlier (English, 1979), as well as lack of sanitation in resources such as shelter, food and water. Nevertheless, during the dry season, torrential rainfall is less likely, which may assist to remove out intermediate hosts of parasites causing damage to the elephants. The current investigation revealed the elephants possessed mild helminthic infections, which were less severe than overt clinical infection. While subclinical infections may not have obvious repercussions, they can lead to long-term health issues. Therefore, even notable infection should not be ignored.

Ectoparasites

Out of 26 elephants screened 4 elephants found infested with the lice. Lice were prominently found in the regions, such as soft skin folds in the ears, head, neck, axilla, groin and base of tail. The golden yellow adult louse was elongated and oval-shaped (Fig. 4). The dorsal surface was dark brown and strongly chitinized, whereas the ventral surface was soft, membranous, and non-pigmented. The triangular head was significantly longer than the thorax and possessed five segmented antennae. In the pre-antennal part, the head had a elongated and rigid rostrum with sharp mandible rasps to pierce the thick skin of elephants and feed on superficial capillaries and skin detritus. The abdomen comprised eight visible segments, separated by inter-segmental constrictions on the lateral borders. Based on the morphological characters, the lice were identified as *Haematomyzus elephantis*. The nits

Fig. 1: Ova of *Bivitello bilharzianairi* x400;

Fig. 2: Ova of *Strongyloides* sp. x400;

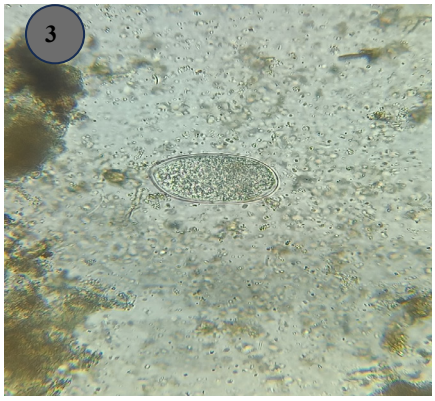

Fig. 3: Ova of Strongyle x100

of the lice *H. elephantis* were also identified from the hairs (Fig. 5). The dipteran larvae collected from the faeces sample was around 3 cm long (Fig. 6) and its anterior end featured two robust oral hooks (Fig. 7) with cephalon-pharyngeal skeleton. The abdominal segments of the bots featured a row of belt-like triangular shaped spines (Fig. 8) and the posterior spiracles had three longitudinal parallel slits (Fig. 9), suggesting that the larvae were of *Cobboldia elephantis*.

Lice are highly adaptable creatures that thrive in diverse ecosystems worldwide. The lice morphology described was consistent with previous studies (Godara *et al.,* 2009; Sudan *et al.,* 2013). The elephant louse, *Haematomyzus elephantis*, has been documented in Karnataka and Mathura (Jagannath *et al.,* 1979; Sudan *et al.,* 2013). Singh *et al.* (2006) and Godara *et al.* (2009) reported its occurrence in a zoological park in Punjab and in a herd from Jaipur, Rajasthan, respectively. Generally, lice infestations might lead to dermatitis, dry skin and scale formation on the neck, ears, abdomen and tail region (Soulsby, 1982), whereas in pachyderms, severe infestation results in blood loss and chronic irritation (Fowler and Mikota, 2006).

Cobboldia elephantis, a stomach bot found in Asian elephants, has been reported in several Indian states including Assam (Raquib, 1970; Chakraborthy *et al.*, 1994), Tamil Nadu (Joseph *et al.,* 1987), Orissa (Panda *et al.,* 2005), Kerala (Kakkassery *et al.,* 2011) and Andhra Pradesh (Venu *et al.,* 2013). Manoharan *et al*. (2016) found a significant prevalence of *C. elephantis* (45%) in free-ranging elephants in Tamil Nadu, Southern India. Generally, *Cobboldia elephantis* flies deposit eggs near Asian elephant tusks. Gastric myiasis is caused by larvae that hatch and develop in the oral cavity before migrating to the stomach. According to Fowler and Mikota (2006), all three stages of larvae get attached to the stomach wall. Eventually developed, the third stage larvae pass through the digestive tract and descend to the ground to pupate. As stated by Raquib (1970), elephants infested with stomach bots had progressive emaciation, inappetance and deterioration in health condition. However, no such symptoms were discovered all through our investigation, indicating a mild infection related to seasonal variation.

Fig. 4: Elongated and oval-shaped *Haematomyzus elephantis* x40;

Fig. 5: Nits of the lice *H. elephantis* x100

Fig. 6: Dipteran larvae found in faecal sample;

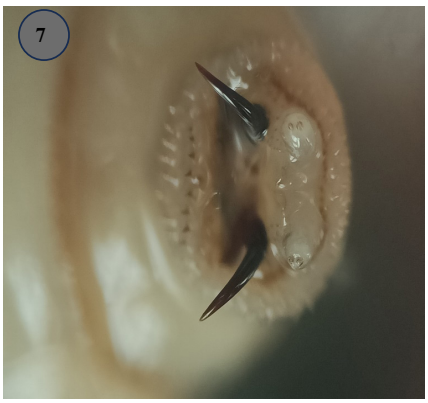

Fig. 7: Two robust oral hooks – *Cobboldia elephantis* x100;

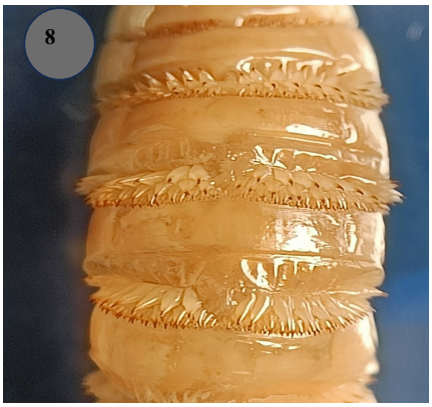

Fig. 8: Row of belt-like triangular shaped spines – *C .elephantis*;

Fig. 9: Posterior spiracles with three longitudinal parallel slits – *C. Elephantis* x100;

Conclusion

The current study thus revealed a notable prevalence of both helminthic and arthropod infections in Asian elephants, highlighting the need for regular monitoring and effective managemental practices. Though the infections were mild and subclinical, they underscore the importance of maintaining proper sanitation and health screenings to prevent long-term health impacts on these endangered species.

Acknowledgement

The authors are thankful to the Dean, Veterinary College and Research Institute, Orathanadu, Thanjavur for the constant support and facilities provided to carry out this study. We also thankfully acknowledge the Deputy Director, Mudhumalai Tiger Reserve for providing the opportunity.

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