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Occurrence of *Sarcocystis* in free ranging wild dogs (*Cuon alpinus*) and golden Jackals (*Canis aureus*) in Deccan peninsular region

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Abstract
The genus *Sarcocystis* has worldwide distribution comprises over 200 species spread amongst domestic and wild animals. Taxonomically the disease belongs to the cyst forming isospora coccidia has an obligatory prey predator two host life cycle. In the free ranging habitat wild dogs in pack has instinct quality to hunt wild herbivore whereas Jackals are dependent on offals and remains feeding. Disease disseminating ability of both wild dogs and jackals in terms of sarcocystosis was envisaged in the present study to assess the occurrence of sporocysts and their species on the basis of morphological and molecular detections. The freshly voided scats of these canines of Pench Tiger Reserves were collected and brought to the School of Wildlife Forensic and Health laboratory for screening the presence of sporocysts of sarcocysts along with other intestinal parasitic eggs and oocysts using qualitative and quantitative techniques of chopra diagnostics. During the entire study period, overall, 72. 5% infection of gastrointestinal parasitism (GIP) was recorded in Jackals with highest infection of *Trichuris* (77.5%), followed by *Toxocara* (62.5%), *Ancylostoma* (25.0%), *Isospora* (22.5%) and *Taenia* (22.5%) in all five zones of Pench Tiger Reserve, whereas, 83.3% infection of GIP was encountered in wild dogs. The highest infection of both *Trichuris* and *Toxocara* (83.3%), followed by *Ancylostoma* (66.6%), *Isospora* (43.3%) and *Taenia* (22.5%) were recorded in all five zones of Pench Tiger Reserve. Subsequently, in jackals, overall 7(17.5%) infection of *Sarcocystis was recorded* in different zones of Pench Tiger Reserve. The highest infection revealed in Zone I (25%) and III (25%) followed by Zone II and V (14%) while lowest observed in Zone IV (10%). Likewise, in wild dogs, overall (90.0%) infection of *Sarcocystis* was found. Amongst different zones of Pench Tiger Reserves, it was recorded highest in Zone I, II and IV (100%) followed by Zone V (85.7%) and III (76.0%). The intensity of sporocysts of *Sarcocystis* infection encountered in higher range (63%) followed by moderate (16.6%) and lowest (13.3%) amongst all scats examined. Apart from that, quantitative analysis has revealed higher OPG (800-8000) in wild dogs while it was recorded low (800-2000) in Jackals. Nonetheless, micrometry leading to shape and size of sporocysts of *Sarcocystis* showed more or less similar entity as 13.5±0.41x8.7±0.26 µm recorded in Jackals as compared to 13.4±0.24x8.2±0.42 µm in Wild dogs.

Keywords: Dhole, jackals, surveillance, *Sarcocystis,* prey- predator borne diseases, Pench tiger reserve

Introduction
Parasitic diseases of prey-predator relationships have epidemiological importance in terms of transmission of infection from sylvatic cycle to domestic cycle while they are explicitly effect the wilderness of free-ranging animals (Singh and Shah 1990) [9]. In different protected and non-protected forest areas, the big cats and wild dogs are prime predators of deer, antelopes and bovines while jackals, hyena, wolf, foxes, civets and vultures act as scavengers to maintain the cleanliness in the forest areas. These scavengers are playing pivotal role to avoid unwarranted disease occurrence as they utilized leftovers as a feeding materials (Prator, 2005) [7]. Albeit without commendable role in the sylvatic cycles these scavengers are also responsible for disseminating utmost infections of parasitic origins. Sarcocystosis is one of the emerging coccidian infections having close relationship between herbivores and carnivores as the sexual reproduction of the disease occurs in canines, felines, raptor birds including human. According to the life-cycle pattern the schizogony takes place in the blood stream of

artiodactyls and forms thread like cysts called sarcocysts in the cardiac muscles and further spread in costal muscles (Fayer *et al.* 2015) [3]. The study focused on surveillance of *Sarcocystis* occurrence in the wild dogs and jackals of Deccan peninsular region particularly around the Pench tiger reserve situated between the Madhya Pradesh and Maharashtra states. Though the infection of *Sarcocystis* was yet not reported in free ranging jackals in this region but encountered in free ranging dhole with high intensity of sporocysts of *Sarcocystis* (Jog *et al.* 2003) [5]. Therefore, there is a need to identify the prevalent species for which wild dog and jackals act as definitive host as most of the time its occurrence has been recorded albeit without assigning name to it. However, the sarcocystosis is the host specific disease with explicit host range (Dubey *et al.* 2008) [2]. Hence, the research work was envisaged confined to morphological variations in the sporocysts of both species to distinct on the basis of morphological features as well. The study involved 70 scats along with 40 scats from golden jackals (*Canis aureus*) and 30 scats from wild dogs (*Cuon alpinus*) collected during defecation in different zones of Pench tiger reserve.

Materials and Methods

Freshly voided faecal sample from wild dogs and jackals was collected in an individually labeled plastic container and divided in to two parts. One part was preserved in 10% buffer formalin and second part kept unpreserved for further laboratory work. These scats sample were brought the laboratory of School of Wildlife Forensic and Health, Jabalpur for assessment of sarcocysts sporocysts along with other gastrointestinal infection in Wild Dogs and Jackals. The faecal samples were screened by using direct smear method as well as floatation concentration technique using Sheather's sugar solution (Soulsby, 1982) [11], to find out oocysts of different coccidian parasites/enteric protozoans. Morphometry of encountered oocysts and eggs of enteric parasites were done with the help of ocular and stage micrometry under different magnifications. The, faecal samples those observed positive for sporocysts of *Sarcocystis* infection in wild dogs and jackals were also used for molecular analysis while intensity of infection was evaluated using criteria as Low- <5 sporocysts, Moderate= 5> sporocysts and High= >10 sporocysts/field under the microscope under 1000x magnification of stereoscopic compound miscroscope.

Results and Discussion

During scats examination, 40 scats of jackals (*Canis aureus*) were screened and found overall (17.5%) infection of *Sarcocystis* in different zones of Pench Tiger Reserve. The low infection of sarcocystosis is directly proportional to feed intake along with matures sarcocysts whereas scavengers are dependent on remains or left over which have less chance to pickup fresh offals of the carcass (Singh and Shah, 1990) [9]. Apart from that Singh *et al.* (2020) [10] have also encountered 26.3% infection of sarcocystosis in jackals of Van Vihar National Park, M. P. which is also more or less similar to the present study. The possibility of low infection in jackals may also be attributed owing to insufficient intake of fresh infected muscles of the carcass as they most of the times depends upon rotten carcasses (Kamler, *et al.* 2021) [6]. Plausibly owing to such habit they have low rate of prevalence of *Sarcocystis*. Furthermore jackals have home range of 45-50 km^2 area of the habitat to search the food availability because lot of species of scavengers in free ranging habitat exist *viz*. hyena, foxes civets and vultures those have maximum share of leftover or killed remains. Therefore, jackals are far behind to pick up fresh carcasses where more chances get infected with sarcocystosis. In the present research work encountering low rate of sarcocystosis is directly or indirectly supporting the previous findings of Singh *et al.* (2020) [10] where they also recorded low rate of prevalence of *Sarcocystis*. The oocyst per gram counting revealed in the present study as 800-2000 sporocysts also express the less intake of infected offals during feeding of left over. In contrast, wild dogs (Dhole) found in the protected and unprotected forest areas of the Deccan Peninsular region of the central India and known for their hunting skill of wild herbivores and carnivores (Prater, 2005) [7]. However, the fauns of deer family are most liked beast of prey to these savage killers. During study period 30 scats of wild dog packs were screened and found overall (90.0%) infection of sarcocystosis. Amongst different zones of Pench Tiger Reserves. High prevalence rate of infection of sarcocystosis was recorded in Asiatic wild dogs (*Cuon alpinus*) in the present study which is also agreed with the findings of Jog *et al.* (2003) [5] who encountered 92-97% prevalence of sporocysts of sarcocystosis in wild dogs of Mudumalai National Park, Wildlife Sanctuary and Tadoba National Park, India. The possible reason behind higher prevalence of sarcocystosis in dholes as compare to jackals might be owing to their hunting abilities as they hunt most preferably to deer antelopes and calves of gaurs (Prator, 2005) [7]. However, the high rate of infection is clearly indicating as expected that the main source of sarcocystosis infections for the wild dogs was the hunting of infected prey animals those becomes lethargic, dull and depressed owing to diseases manifestations and early victimization takes place (Dubey, *et al.* 2008) [2]. Even though the wild dogs are capable to hunt any free ranging wild animal comes within the target but they mostly preferred herbivores those wonder alone or isolated from the herd (Arayal *et al.* 2015) [1]. In the present study, it was observed that the wild dogs of Pench Tiger Reserves have made the home range specifically to Alikatta and Turia range where chital were kept in the enclosure for translocation to another protected areas. Thus they potentially ambush towards enclosures when young faun jump to across the encloser and come out these animals targeted by wild dogs. More over wild dogs packs also targets the adult herbivores in the free range habitat those lost their speed and agility. Therefore, occurrence of sarcocystosis (90-100%) with high OPG from 1200-8000 sporocysts/wild dogs (Table 1) is self-explanatory that free ranging wild dogs are ideal disseminator of the sarcocystosis infection in the grazing field of the herbivores where they pick up the *Sarcocystis* infection. Furthermore, these wild dogs have also strong killing instinct to prey in such a organized way where each member of the pack share the hunted animals thus they finish the carcass within hours. Ghaskadabi *et al.* (2022) [4] have also studied the feeding ecology of the endangered Asiatic wild dogs across tropical forests of the central Indian landscape with same observations as encountered in the present study.

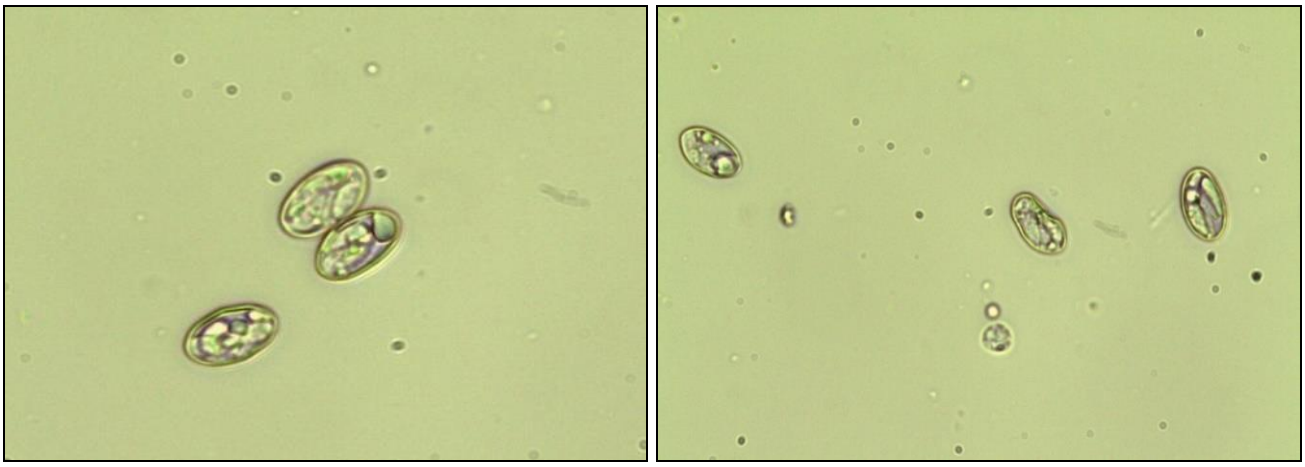

Fig 1: Photomicrograph showing sporocysts of *Sarcocystis spp* (A: recovered from wild Dog b: recovered from Jackal- 1000x)

Table 1: Prevalence of Sporocysts of *Sarcocystis* in the scats of Jackals and Wild Dogs of Pench Tiger Reserve

Zones	Animal	No examined	Found positive	Oocysts/gram	Measurement of sporocysts
1	Jackals	40	7 (17.5%)	800-2000	13.5±0.41x8.7±0.26
2	Wild Dogs	30	27 (90.0%)	1200-8000	13.4±0.24x8.2±0.42
3	Overall	70	34(48.8%)	800-8000	13.4-15.f5x8.7-8.9±1.42

Encountered sporocysts of *Sarcocystis* those recovered from scats *of* both wild dogs and jackals were measured confined to their shape and size found 13.5±0.41x8.7±0.26 in jackals whereas 15.05±1.13x8.9±1.00 µm recorded Wild dogs. Such comparative study in terms of morphological variations in the shed sporocysts of jackals and wild dogs in the same domain were not compared in India and abroad while Jog *et al*. (2003) [5] have measured sporocysts of wild dogs ranging from 16.0x10.0µm which is more or less similar to the present study. Singh (1990) [9] also measured sporocysts of dogs (14.98±1.23 x9.83±0.24 µm) fed goat offals infected with sarcocysts during study subjected to shedding sporocysts by individual experimental dogs during patent period. Variations in the shape and size of the shed sporocysts in jackals, wild dogs might be due to harbouring different species of *Sarcocystis* needs further investigation leading to evaluate the pre-patent and patent period of the disease in respect to epidemiological studies.

Conflict of Interest

Authors have no conflict of interest as the scats of both species (Golden Jackals and Wild dogs were collected using non-invasive techniques.

Conclusion

The jackals and wild dogs are disseminating the *Sarcocystis* infection in wild herbivores of Pench Tiger reserve which is responsible abortion and sudden death of wild herbivores. The low rate of infection of *Sarcocystis* in jackals express that they are mostly pick-up the infection through offals feeding while wild dogs are hunter and they ambush the fauns of deer and antelopes and known for savage killing got fresh muscles and visceral organs. Hence they have overall high rate of infection of *Sarcocystis*

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References

1. Arayal A, Panthi S, Barraclough RK, Adhikari B, Ji W, Raubenheimer D. Habitat selection and feeding of Dhole (*Cuon alpinus*) in the Himalayas. J Mammal. 2015;96(1):47-53.
2. Dubey JP, Humphreys JG, Fritzf DA. New Species of *Sarcocystis* from the Black Bear (*Ursus americanus*). J Parasitol. 2008;94(2):496-499.
3. Fayer R, Esposito DH, Dubey JP. Human Infections with *Sarcocystis* Species. Clin Microbiol Rev. 2015;28(2):295–311.
4. Ghaskadbi P, Bathla N, Bhandari A, Modi S, Nigam P, Habib B, *et al*. Feeding ecology of the endangered Asiatic wild dogs (*Cuon alpinus*) across tropical forests of the Central Indian Landscape. Sci Rep. 2022;12(1):1-11.
5. Jog MM, Marathe RR, Goel SS, Ranade SP, Kunte KK, Watve MG. *Sarcocystis* infection in chital (*Axis axis*) and Dhole (*Cuon alpinus*) in two Indian protected areas. J Zoo Print. 2003;18(10):1220-1222.
6. Kamler JF, Minge C, Rostro-García S, Gharajehdaghipour T, Crouthers R, In V, *et al*. Home range, habitat selection, density, and diet of golden jackals in the Eastern Plains Landscape, Cambodia. J Mammal. 2021;102(2):636-650.
7. Prator SH. The book of Indian animals. Bombay natural history society. 12th ed; c2005. p. 274-297.
8. Singh KP. Studies on some aspects of caprine sarcocystosis in and around Jabalpur (M.P.) [PhD thesis]. Jabalpur: Rani Durgavati Vishwa Vidhyalaya; c1990.
9. Singh KP, Shah HL. Offals from slaughtered goats as a source of infection of *Sarcocystis capracanis* for dogs. Indian J Anim Sci. 1990;60:13-15.
10. Singh KP, Jadav K, Gupta A, Rajput N, Rokde A, Dhairykar M. Occurrence of Sarcocystosis in jackals (*Canis aureus*) of Van Vihar National Park. In: Proceedings of the 29th National Congress of Veterinary Parasitology and National Symposium; c2020.
11. Soulsby EJL. Helminths. Arthropods and Protozoa of Domesticated Animals. 7th ed. Elsevier, Bailliere Tindall; c1982. p. 159-160.