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RESEARCH ARTICLE

A SURVEY OF ECTOPARASITES ON MAMMALS IN ARIGNAR ANNA ZOOLOGICAL PARK, CHENNAI, SOUTH INDIA

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ABSTRACT

This aim of this study was conducted to evaluate the abundance and diversity ectoparasites associated with mammals in Arignar Anna Zoological Park (AAZP). Ectoparasites are a diverse and highly adapted group of animals that infest the external body of vertebrates. The empirical study was to attempt the first time report of this park (AAZP). We are examined for total of 412 Mammals were analysis throughout the study period. A total of 13 mite's species belonging to 10 genus, 10 ticks' species belonging to 5 genus, 5 flea species belonging to 2 genus and 4 lice species belonging to3 genus were collected from our study. The overall prevalence of ectoparasites was significantly higher in cage compare than runs. Statistically calculated the Simpson diversity index was more in cage (0. 98805) of mites were noted. In mammals the prevalence of ticks in cage (85%) and in runs (15%) were recorded. Similarly, the Simpson diversity index of flea was rich in runs (0. 97105) respectively. The prevalence of lice in cage (65%) and in runs (35%) was noted in mammals.

Key words: Mammals, Ectoparasites, Species diversity, Arignar Anna Zoological park, Chennai.

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INTRODUCTION

Zoo is a place in where animals are restricted within enclosures, displayed to the public for education and recreation and in which they may also be bred. It tends to focus on rare, threatened, and endangered vertebrates they also can collect and conserve associated ectoparasites. The present study attempted in Arignar Anna Zoological Park, which is recognized as one of the innovative zoo in the last three decades. Interactions of humans, captive animals, and free-roaming wildlife in zoos often are associated by arthropods such as cockroaches, flies, fleas, lice, mosquitoes, mites and ticks. Ectoparasites are common in nature and parasitize humans and animals. These obligate parasites live, feed and shelter on or just beneath the surface of their host's epidermis, hair or feathers (Marshall, 1981). In some cases, infected animals may resort to self-wounding particularly when ectoparasites are present in high densities (Berriatua *et al.,* 2001). Feeding activity of the ectoparasites may result in significant blood loss, secondary infestations, pruritus, and excoriation and in some cases premature death. Ticks are notorious vectors of numerous pathogenic organisms, such as protozoa, rickettsiae, bacteria and viruses. This organism causes serious and life-threatening illnesses in humans and animals **(**ChulMin *et al.,* 2006**).**

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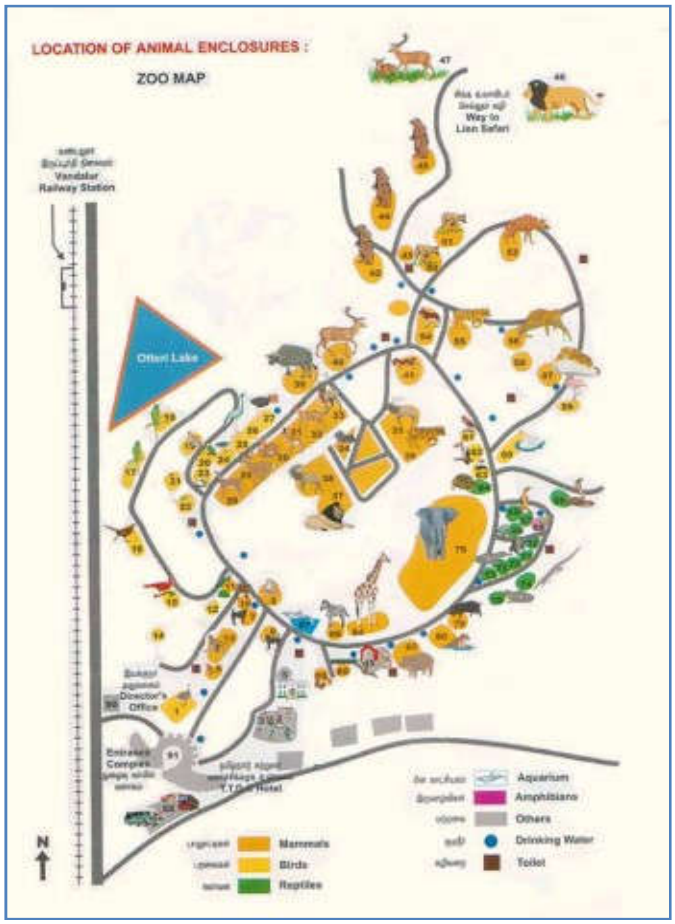
Fleas are wingless insects, belonging to Siphonaptera order. There are nearly 2000 species of fleas (95%) found on mammals, but fewer species can be found on birds and other hosts. There is currently much debate about how climate change will alter the distribution and prevalence of infectious diseases (Wilson, 2009). Vector-borne diseases may be particularly vulnerable to change because of the sensitivity of their arthropod vectors to climatic conditions. The effect of temperature and humidity on the existence and biodiversity of ectoparasites has been well identified, and well understood that different species have specific requirements for development and reproduction. The Arthropod ectoparasites are in diverse form and highly adapt group of animals that inhabit the external body surfaces of vertebrates. Hence, the present studies we are focused to common ectoparasites diversity of mites, ticks, fleas and lice were observed during the study and climatic factors (Temperature, Rainfall and humidity)also observed.

MATERIALS AND METHODS

Study area

Arignar Anna Zoological Park (AAZP) popularly known as Vandalur Zoo is located at few kilometres away from the city of Chennai spread over a sprawling area of 602 hectares in the latitude 12. 8797° N and longitude of 80. 0884° E. It is one of the largest zoos in South East Asia and is the first public zoo of

India. A total of 412 Mammals were examined for about one year (2010-2011) from January to December. Animal ectoparasites were collected during a fixed time of early morning and late evening hours. The meteorological data was also recorded throughout the study period. The whole body of the animal was combed with a stainless steel fine-toothed comb for collection of ectoparasites. Experimental sample like dust, litter, debris and residues from the upper surface of cages and run-offs of mammals were carefully removed at the same time we recording of location, host, and date until the documentation of specimen.



The collected samples were carefully transported in to the laboratory for the extraction of ectoparasites by using Berlese funnel method. About 10 ml of 70% ethanol is taken in the collection vials and kept in to under the funnel. Collected Ectoparasites sample was identified under the stereomicroscope, according to performed to the standard methods we are used to identification purpose. The keys order were given by following authors for mites **(**Krantz and Walter,2009), feather mites (Gaud and Ateyo, 1996), tick (Sen, 1938 and Geevarghese *et al.,* 1997)lice (Price *et al.,* 2003) and flea (Parhost, 2005) with the help of some taxonomical experts in the same field. The Shannon- Weiner index was calculated for diversity analysis.

RESULTS AND DISCUSSION

In the present study, a total of 412 numbers of mammals were examined. In mammals, 13mites species, 10 ticks species, 5 flea species and 4 lice species were observed. In mammals the prevalence of mites in cage (86%) and in runs (14%) was noted. The Simpson diversity was more cage (0. 98805) was noted. In mammals the prevalence of ticks in cage (85%) and in runs (15%) were noted. The Simpson diversity was more in cage (0. 98046) were noted. In mammals the prevalence of flea in cage (63%) and in runs (37%) were recorded. Similarly, The Simpson diversity was rich in runs (0. 97105) respectively. The prevalence of lice in cage (65%) and in runs (35%) was noted in mammals. Similarly, the Simpson diversity more in runs (0. 98723) was recorded. The prevalence of mites and ticks were recorded more in cages of mammals compare with habitats of runs. It's may be due to attributed for higher temperature, humidity, surrounding environmental factor and prolonged sunlight may favor for their survival and reproduction of ticks in cages. The significant work has been done on the aspect of economic importance, ecology, pathogenesis and prevalence of Phthirapteran ectoparasites infesting different aves and mammals (Trivedi *et al*. (1992); Saxena *et al*. (2004); Gupta *et al*. (2007); Khan *et al*. (2009). The occurrence of flea and lice were observed more in mammal cages. Animal movement was restricted could result to higher ectoparasite infestation in affected animals (Hebb *et al.,* 2000; Edosomwan and Amadasun, 2008). Similarly, in the present study the ectoparasites more abundant in all the cages. The reason was due to the wet or moisture condition that favors to increase their population.

The nocturnal animals are maintained in cages without predicting to sunlight. Morand and Poulin 1998; Morand *et al.,* 2000) emphasized that host density may favor the accumulation of parasitic species and, consequently, that hosts living in a high density should harbour more parasitic species than hosts living at a low density. Moreover, the basic models of Anderson and May (1978) also predicted that parasite abundance and prevalence would increase within host density. Similarly, the number of animals placed in a cage, this also may be the reason for the abundance of more ectoparasites in cages. So these are the reasons for the more ectoparasites occurrence in cages when compared to other living habitats. From this study, the differences in the prevalence of ticks and fleas in each animal may be due to the differences in animal immunity or the different areas of prevalence and density of ticks and fleas. These differences might be due to the dissimilar temperature or moisture in each area that affects the growth and reproduction of the ectoparasites. The arthropod ectoparasites may have a variety of direct and indirect effects on their host. They can also be site specific. They are present on almost all species of mammals, including bats (Ritzi and Whitaker, 2003). Ectoparasites were widely distributed in different parts of the host body such as ear, neck, tail, mammary gland, udder, groin and anal area region of which udder, dewlap, anal area and tail regions were most infested parts of animal body and face and neck. *Ctenocephalides canis* has a greater concentration on the legs and tail region of animal. Ticks were widely distributed in different parts of the host body such as ear, neck, tail, mammary gland, hind legs, neck, pelvic and udder. Similarly the *Ixodes ceylonensis* a and *Boophilus microplus* were noted in leg and tail region of Mammals. Adults parasitize ticks various domestic herbivores, including camels, and wild animals such as sheep, goats, deer, pigs and wolves. Other mammals, such as dogs, clouded leopards and humans, are sometimes parasitized by *Rhipicephalus haema physaloides* (Shen *et al.,* 1997;Grassman *et al.,* 2004). In addition due to the reconstruction of the enclosures, many animals were transferred from one enclosure to another and were mixed with other species of animals. This might be the reason why despite antiparasitic treatment in some species of animals, different species of parasites were found each year.

Table 1. Prevalence and diversity indices for the mites, ticks, flea and lice observed in mammals among different Habitats (Cage and Runs).

S.No	Host	Mites	Ticks	Flea	Lice
1.	Deer Barking Muntjac	*Amblyseius sp.* *Typhlodromus sp.*	*Dermacentorsp*	NF	NF
2.	Deer Hog	*Parasitus sp.* *Acarus sp.*	*Dermacentorsp*	NF	NF
3.	Deer Sambar	*Macrocheles sp.* *.Amblyseius sp.* *Typhlodromus sp.* *Parasitus sp.* *Rhizoglyphus sp.*	*Boophilus microplus*	NF	*Menopon pallidumvitz* *Bovicolasp.*
4.d	Deer Spotted	*Macrochelessp.* *Amblyseius sp.* *Typhlodromus sp.* *Parasitus sp.* *Rhizoglyphussp*	NF	*Ctenocephalidescanis*	*Menopon pallidumvitz* *Bovicolasp.*
5.	Giraffe	*Macrochelessp,* *Cheyletus sp.* *Rhizoglyphus sp.* *Amblyseius sp.* *Parasitussp*	*Rhipicephalus sanguineus* *Ixodes ceylonensis* *Ornithodoros megnini*	NF	NF
6.	Palm Civer Cat	NF	*Ixodes Ceylonensis,* *Ornithodoros megnini*	*Xenopsylla Cheopsis,* *Xenopsylla sp.*	NF
7.	Elephant Indian	*Acarussiro,* Acarus*sp.* Protonymph of *Amblyseius sp.*	NF	NF	NF
8.	Jackal	*Acarussiro,* *Acarusfarris*	*Rhipicephalus haemaphysaloides*	NF	NF
9.	Macaque Pig Tailed	Dermanyssus sp.	NF	NF	*Polyplax spinulosa*
10.	Macaque Rhesus	*Protolychus sp.* *Acarus sp.* *Tyrophagus sp.*	NF	NF	NF

A. Ticks seen in ear of deer

B. Mites observed in Rabbit

***C. Macrochelessp*D**

D. *Amblyommasp*

E. *Ctenocephalids sp.*

F.*Liperussp.*

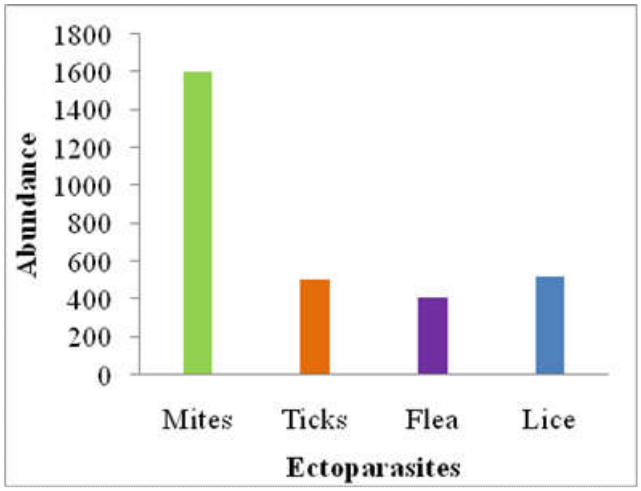


Fig. 1. Abundance of ectoparasites in Mammals.

Conclusion

Findings of the survey thus demonstratedthe presence of some ectoparasites ofsmall mammals which has potential health safety in this zoo. It is necessary to control parasitic infections therapy and cage hygiene. Regular parasite controls of food and water should also be conducted, quality food and appropriate addition of vitamins and minerals is an additional measure to reduce the risk of parasitic infections.

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