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A TICK SURVEILLANCE STUDY IN RESCUED SNAKES OF SOLAPUR DISTRICT, MAHARASHTRA: THE TICKS INFESTING RESCUED SNAKES OF SOLAPUR: A PREVALENCE ANALYSIS

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Abstract

A study was conducted to examine the prevalence of ectoparasites, particularly ticks, in rescued snakes from Solapur district, Maharashtra. Thirty-six rescued snakes, consisting of 12 venomous and 24 non-venomous, were examined for tick infestation, with 25.71% of the snakes found to be infested with ticks. Indian rat snakes and Indian spectacled cobras were found to be commonly infested, with 54.54% and 42.82% infestation rates, respectively. Male snakes were more infested than female snakes, and snakes nearing ecdysis or having fine scales did not exhibit any tick infestation. The majority of ticks identified were of the Amblyomma genus, except for one Indian spectacled cobra that was found to be infested with a mixed genus of ticks. The study highlights the potential impact of tick infestation on captive or wild reptile populations, as these parasites can transmit diseases such as rickettsiosis, anaplasmosis, and ehrlichiosis. This study aims to provide a baseline for future research investigating the factors that influence tick infestation in snakes and to develop effective management strategies.

INTRODUCTION

Snakes belong to sub order Serpentes of Squamata order and class Reptilia. They are elongated, slender bodied, carnivores and can be distinguished from legless lizards by their lack of eyelids and external ears. They are ectotherms like all squamates and have covering of Overlapping scales. Many species of snakes have skulls with several more joints than their lizard ancestors, enabling them to swallow prey much larger than their heads with their highly mobile jaws. Snakes like to eat rats, birds and their eggs, mice, frogs, gophers and other small rodents. Some species may even consume insects and earthworms.

Snakes play important role in ecosystem by regulating the population of prey example rodents as they reproduce exponentially in the absence of predators. Snakes tend to control rodent's population in particular. Snakes make up a significant proportion of middle order predators that keep our natural ecosystem working. Snakes are predators and feed on a variety of many harmful bugs and insects. Larger one eats mice, rats and other small mammals that can destroy crops and damage property.

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The parasitic burden is often heavy, everybody surface and organ may be invaded by some kind of larval or adult parasites. Wild and captive reptiles are infected and infested with a great variety of parasites. Numerous parasites are responsible for illness and death in captive reptiles.

Information on tropical snake's ectoparasitism by ticks is still relatively scarce in literature and usually data collected from snakes in captivity.

Tick infestation is one of the major problems in reptiles. Commonly encountered ticks are *Ornithodoros* spp., *Amblyomma* spp. and *Aponomma* spp. Geevarghese and Dhanda (1995) and Ghosh *et al*. (2007), reported that in India *Aponomma gervaisi* (Lucas, 1847), *Aponomma leave Neumann*, *Aponomma lucasi* and *Aponomma pattoni* are frequently encountered ticks in reptile hosts.

Ticks are the important ectoparasites that occur on snakes and transmit rickettsiosis, anaplasmosis and ehrlichiosis (Kho *et al.,* 2015). In India, *Amblyomma (Aponomma*) ticks are known to transmit *Coxiella burnetti* and *Rickettsia honei* in human (Pandit *et al*. 2011.) Also, the *Aponomma* spp. is reported on pythons, cobra and rat snakes (Soundararajan *et al.,* 2013).

Ticks are also responsible for causing skin infections in snakes.

Ticks are classified under the order Acari and they are obligate ectoparasites of vertebrates. There are three active stages in the life cycle of a hard tick: larvae, nymphs and adult. Most ticks require three different hosts to complete one full cycle. During each stage of metamorphosis, the tick after completion of feeding, drop off from the host, molt and wait for another host for next stage. Ixodid ticks ingest very large quantities of blood, amounting to several hundred times their unfed weight. Surprisingly, tick feeding is generally very wasteful, as large amounts of hemoglobin are passed into the feces unchanged; the quantity of blood passed in the feces during feeding can equal or even exceed the final engorgement weight of the tick.

The aim of the current study is to record the prevalence of tick infestation on different species of wild snakes found in Solapur district of Maharashtra, India.

MATERIALS AND METHODS

Samples were collected from rescued snakes in Solapur district of Maharashtra. Snakes mitra (friends) get call from local people for rescue of snakes from their houses, garages, farm houses, etc and samples from these rescued snakes were collected by contacting them. Permission was obtained from forest department to carry out the research on tick infested snakes.

Snakes were restrained by using snake hook, tubes (for holding snakes head) and rescued snakes (included in this study) were examined for ticks. Ticks were collected and preserved in 70% alcohol. All snakes were weighed by using electronic balance and length was measured by using inch tape. All snakes (included in this study) were sexed by using snake probe after applying of gel on probe and gentle pressing of cloaca by thumb. For identification of ticks, they were processed and mounted. First, the preserved ticks were boiled in 10% sodium hydroxide (NaOH) for 10 minutes, followed by cooling in cold water. Then ticks were dehydrated in ascending grades of alcohol viz., 70% alcohol, 90% alcohol and finally absolute alcohol for 5 minutes each. After that ticks were placed in carbolic acid for 5 minutes for clearing and then ticks were mounted on slides by use of DPX mount. For this, 12 drop of DPX was put on glass slide and then cleared ticks were placed from ventral side up and placed the cover slip on it. The mounted glass side was kept undisturbed till dry. All mounted ticks were examined under micro scope (stereo zoom microscope) and examined their capitulam and mouth parts. All ticks were identified by using keys furnished by Soulsby (1982).

RESULTS

A total number of 36 (n) snakes were examined during study period. Out of 36 snakes, 4 species of venomous and 9 species were of non-venomous. Four venomous snake species were Indian

Spectacled Cobra (*Naja naja,* Linnaeus, 1758), Russell's viper (*Daboia russelii*, Shaw & Nodder, 1797), Common krait and slender coral snake (*Callophis melanurus*). Nine non venomous snakes were Indian Rat

snake (*Ptyas muscosus,* Linnaeus, 1758), Banded Kukri (*Oligodon arnesis*), Common Wolf Snake (*Lycodon aulicus*), Common Cat Snake (*Boiga trigonata*), Trinket Snake (*Elaphe halena*), Banded Racer (*Argyrogena fasicolatus*), Checkered keel back (*Xenochropis piscator,* Schneider, 1799), green keel back (*Macropisthodon plumbicolor*) and red sand boa (*Eryx johnii*).

Out of the 36 snakes 33.33% (12) were found venomous and 66.67% (24) were found non venomous.

Out of the 36 snakes 25.71 % (9) of snakes were found infested with ticks, out of which 33.33 % were Indian Spectacled Cobra and 66.67 % were Indian rat snakes. Out of the total Indian rat snakes 54.54 % of snakes were infested with ticks and of the total Indian spectacled cobra 42.85 % of snakes were infested with ticks.

Of the 9 snakes infested with ticks, 88.89 % were male and 11.11 % were female irrespective of snake species. In Indian Spectacled Cobra 66.67 % of males and 33.33 % of females were infested with ticks while in Indian rat snake 100 % of male snakes were infested with ticks. Of the 9 snakes infested with ticks, 44.44 % of snakes were severely (>16) infested and 33.33 % and 22.22 % of snakes were infested moderate (6-15) and mildly (1-5) with ticks respectively.

All 9 snakes were infested with ticks of *Amblyomma* spp. which is common in ticks found on snakes. *Amblyomma* genus was confirmed by keys for identification of ticks. *Amblyomma* has loner mouth parts as compare to basis capitulum. Basis capitulam is of rectangular in shape and second portion of palp is longer than other portion of palps. One Indian spectacled cobra snake was infested with *Amblyomma* spp. and *Rhiphicephalus* spp. While examination of snakes for ectoparasites on their body few other observations were also made which were.

Snakes at nearing stage of ecdysis, do not have infestation with ticks even after they were of huge in size in terms of body weight and length. Likewise snakes with smooth or fine scales did not have tick infestation.

Ticks were attached with snake mostly on the lateral aspect, irrespective of snake species. Not even one single tick was observed over the last one third region of snake body especially tail region. Ticks were observed on first one third and middle part of snake body.

Ticks were observed on snakes of long length around more than 100 cm and heavy body weight around more than 500 gm. No ticks were observed on small snakes.

PRESENCE OF TICKS ON SNAKE'S BODY

Ectoparasite (*Amblyomma* spp

DISCUSSION

The focus of this study was on to find out prevalence of ectoparasites especially ticks in free ranging snakes as there is less literatures available on free ranging snakes and species of ticks in these snakes. This study was conducted in Solapur district, Maharashtra and results supported the previous study done by Pandit P *et al*. in 2011 at Western Ghats of Maharashtra. Snakes of different species infested with different species of ticks were attributed to their size, sex, physiological changes, body parts, scales etc.

In this study snakes were infested with ticks, mostly collected ticks were belonged to *Amblyomma* spp. which is in agreement of previous studies done by various researchers in free ranging and captivity (Soundararajan *et al.* 2013, Prathipa *et al.* 2014, Nakulan *et al*. 2015, Harkare *et al.* 2007, Pandit *et al*. 2011).

In this study one Indian Spectacled Cobra was infested with mixed genus of ticks, namely *Amblyomma* and *Rhiphicephalus*. This is the first report of occurrence of *Rhiphicephalus* tick in Indian spectacled cobra. No previous study reported the presence of *Rhiphicephalus* in snakes.

In this study two species of snakes Indian Spectacled Cobra and Indian Rat Snake were found positive for tick infestation which is supported by previous study by Pandit *et al.* in 2011. Male snakes (both species) were more infested with ticks as compared that to female one which is in contrary to the study carried out by Arunachalam *et al.* (2017) stated that reported that female rat snake showed higher tick infestation.

All ticks observed in this study were present on lateral aspect of snake's body at first one third and middle portion of snake. No ticks were found on ventral portion, tail of snake. These results are in agreement with the previous study done by earlier workers (Pandit *et al.,* 2011, Arunachalam *et al.*, 2017).

In this study prevalence of ticks in free ranging snakes was 25.71%. Pandit *et al*. (2011) observed the prevalence of 29.16 % and 30.00% in Indian rat snake and Indian spectacled cobra respectively. Pontes *et al.* (2009) reported 25% prevalence of ectoparasites in snakes. Relatively longer snakes in both species were infested more with ticks. Snakes which were nearing to ecdysis were observed to have no tick infestation even though they are extremely longer. This result is in agreement with the findings of Ramesh *et al.* (2013). In this study, more ticks were encountered on the snakes living on the ground. This study was further supported by the findings from Kim (2006) who opined that, snakes as well as the toads living on the ground would be expected to acquire more ticks.

CONCLUSION

This study was undertaken in snakes rescued at places in and around the Solapur district of Maharashtra, India during the month of June, 2018. The design of this study consisted of examination of evidence of ectoparasites in the rescued snakes which represent the wild population. In this study, measurement of body weight, length and sexing was carried out in all rescued snakes and then they were closely examined for presence of ticks. All ticks were collected and preserved in 70% alcohol and processed by standard procedure. Then all ticks were identified using standard identification keys.

All the ticks encountered on the snakes during the study were of *Amblyomma* spp. except an Indian Spectacled Cobra which was infested with mixed group of ticks namely *Amblyomma* spp. and *Rhiphicepahlus* spp. In India, infestation of Indian Spectacled Cobra with *Rhiphicepahlus* spp. was not yet reported.

Prevalence of ticks in free ranging snakes was 25.71% and the presence of ticks was observed only in Indian Spectacled cobra and Indian rat snake. In this study, no ticks were observed in head, tail and ventral region of snakes.

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