Tick infestation in human beings in the Nilgiris and Kancheepuram district of Tamil Nadu, India

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Abstract Thirteen human beings were infested with ticks at Sandynallah and Gudalur of the Nilgiris district and Mottur Suruvakkam of Kancheepuram district of Tamil Nadu from January 2016 to December 2016. The collected ticks were identified as *Rhipicephalus haemaphysaloides*, *Otobius megnini* and *Hyalomma isaaci*. The tick infestation was observed more on the persons working with animals (sheep and goats) than those working in tea estate. The person infested with *R. haemaphysaloides* revealed erythematous papule (2 mm size) and inflammatory lesion up to 16 days whereas, the people infested with *H. isaaci* showed continuous itching and irritation for > 6 months and wound formation (0.5 cm) at the biting site. The people infested with *O. megnini* showed irritation, vomiting sensation and fever.

Keywords Tick · Human · *Rhipicephalus haemaphysaloides* · *Otobius megnini* · *Hyalomma isaaci*

Introduction

Ticks are widely distributed all over the world which transmit various infectious agents like virus, bacteria, rickettsia and protozoa to livestock, humans and companion animals (de la Fuente et al. 2008; Reye et al. 2013). In humans, ticks can cause paralyses, toxicoses, allergy, and irritation and also transmit infectious diseases (Estrada-Pena and Jongejan 1999). Among the various ticks, *Rhipicephalus haemaphysaloides* is a three-host tick affecting cattle, sheep and goat and transmits babesiosis in animal and Kyasanur Forest disease in human (Zhou et al. 2006). *Otobius megnini* is a one host tick found on dog, cattle, sheep, goat, horse and on human (Kingston 1936; Chellappa and Alwar 1972; Chellappa 1973; Matthews 1989; Geevarghese et al. 1997; Malik and Maqbool 1999; Soundararajan et al. 2000, 2002; Keirans and Pound 2003). *Hyalomma isaaci* is a two-host tick occurs mostly on cattle, buffalo, sheep and goat (Geevarghese et al. 1997) and considered to be an important vector for Crimean–Congo haemorrhagic fever (CCHF) (Mourya et al. 2016). This paper reports occurrence of tick infestation in human beings in The Nilgiris and Kancheepuram districts of Tamil Nadu, India.

Materials and methods

A total of 33 suspected human beings (14 male and 19 females) were examined for the presence of tick infestation at Sheep Breeding Research Station (SBRS), Sandynallah and Tea estate, Gudalur of the Nilgiris district and Mishabi goat farm, Mottur Suruvakkam of Kancheepuram district of Tamil Nadu from January, 2016 to December, 2016. Clinical signs were recorded from the affected persons. The

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ticks were collected only from the persons working in the organized sheep and goat farms and in the tea estate. The ticks were collected from the workers with their full concern and cooperation. Hence, the ethical approval may not be necessary for this study. The collected ticks were preserved in 70% ethanol. The specimen was observed under a stereozoom microscope (Labomed, India) for species identification (Soulsby 1982; Walker et al. 2003).

Results and discussion

The data on occurrence of tick infestation of human beings are depicted in Table 1. The collected ticks were identified as *Rhipicephalus haemaphysaloides*, *Otobius megnini* and *Hyalomma isaaci*. *Rhipicephalus haemaphysaloides* was identified based on the presence of hexagonal basis capitulum, eyes and 2 medium-sized spurs on Coxa 1 (external spur was shorter than the internal one). In males, adanal plate was sickle-shaped and the accessory plate with a sharp end. The spiracular plate was large and comma-shaped (Fig. 1a, b). The nymphal stage of *O. megnini* was identified based on constriction at the middle of body with fiddle shape, presence of spines on the surface and eight legs (Fig. 1c, d). *Hyalomma isaaci* was identified based on dark glossy brown colour, long mouth parts and the presence of deeply bifid first coxae (Long and pointed external spur and broad and blunt internal spur) and the presence of single triangular spur on the 2nd, 3rd and 4th coxae. Legs had pale discolored ring on all the joints. Spiracles were oval in shape. The genital aperture was broad U shaped in females (Fig. 1e, f).

Among the infested persons, 76.92% were workers of sheep and goats farms, 15.38% were those working in tea

estates and 7.69% were those without any history of contact with animals.

Nymphal stage of *R. haemaphysaloides* was collected from persons of three different ages (15, 42 and 48 years). After removal of nymphal stage of *R. haemaphysaloides* from a 15 years old girl, tick bitten spot revealed erythematous papule of 2 mm in size and the inflammatory lesion was observed up to 16 days and then healed spontaneously. Affected people showed severe irritation, itching and watery discharge from the center of the erythematous inflammation (Fig. 2a, b).

Nymphal stage of *O. megnini* was observed from 7 human beings at Sheep Breeding Research Station, Sandynallah, The Nilgiris district, Tamil Nadu. In the present study, *O. megnini* was observed in those persons with frequent contact with sheep and goats. They were either shepherds or workers engaged in cleaning of shed. Similarly, Chellappa (1973) reported 2 shepherds infested with *O. megnini* where as Joseph (1982) reported *O. megnini* in the ear of a women while basking in the sun on the lawn at Sheep Breeding Research Station, Sandynallah, The Nilgiris, Tamil Nadu. Eads and Campos (1984) and Merten and Durden (2000) reported *O. megnini* in the ear of humans in USA whereas, Miyamoto and Miyamoto (1990) recorded *O. megnini* in the conjunctiva of the child in Japan.

The people infested with *O. megnini* showed irritation, vomiting sensation and fever. Noble and Noble (1981) opined that *O. megnini* can cause edema, haemorrhage, thickening of stratum corneum and partial deafness in cattle.

Semi-engorged adult female *H. isaaci* ticks were collected from 3 persons (6, 24, 52 years old) at Gudalur, The Nilgiris, Tamil Nadu. The people infested with *H. isaaci* showed continuous itching and irritation for more than

Table 1 Occurrence of ticks on human beings

Place	No. of persons examined	Age group in years			Sex		No. of person infested %	Tick species
		< 20	> 20–50	> 50	Male	Female		
Mishabi goat farm, Mottur Suruvakkam, Kancheepuram	6	16.67 (1/6)	33.33 (2/6)	0.00 (0/6)	0.00 (0/2)	75.00 (3/4)	50.00 (3/6)	<i>Rhipicephalus haemaphysaloides</i>
SBRS, Sandynallah, The Nilgiris	15	6.67 (1/15)	20.00 (3/15)	20.00 (3/15)	37.50 (3/8)	57.14 (4/7)	46.67 (7/15)	<i>Otobius megnini</i>
Tea estate, Gudalur, the Nilgiris	12	8.33 (1/12)	8.33 (1/12)	8.33 (1/12)	25.00 (1/4)	25.00 (2/8)	25.00 (3/12)	<i>Hyalomma isaaci</i>
Total	33	9.09 (3/33)	18.18 (6/33)	12.12 (4/33)	28.57 (4/14)	47.37 (9/19)	39.39 (13/33)	

^a Parenthesis indicate number of animals

Fig. 1 **a** *Rhipicephalus haemaphysaloides*—dorsal view. **b** *Rhipicephalus haemaphysaloides*—ventral view. **c** *Otobius megnini*—dorsal view. **d** *Otobius megnini*—ventral view. **e** *Hyalomma isaaci*—dorsal view. **f** *Hyalomma isaaci*—ventral view

a

b

c

d

e

f

3 months and formation of wound (0.5 cm) at the biting site (Fig. 2c, d).

Literature survey revealed that the human beings are mostly infested with *Rhipicephalus sanguineus*

(Guglielmone et al. 1991; Campbell and Bowles 1994; Dantas-Torres et al. 2006; Okoli et al. 2006; Uspensky 2009; Mentz et al. 2016), *Haemaphysalis longicornis* (Maeoka et al. 1990), *H. megaspina* (Seishima et al.

Fig. 2 **a** *Rhipicephalus haemaphysaloides* tick bite wound on a 15 year old girl.
b *Rhipicephalus haemaphysaloides* tick bite wound (erythematous papule) on a 15 years old girl.
c *Hyalomma isaaci* tick bite lesion on a 6 years old boy.
d *Hyalomma isaaci* tick bite lesion on a 24 years old lady

2000), *Ixodes holocyclus* (Miller 2002), *I. sinensis* (Zheng et al. 2011), *Amblyomma americanum* (Campbell and Bowles 1994; Childs and Paddock 2003) and rarely infested with *Amblyomma* and *Ixodes* sp ticks. In India, only 3 ticks namely, *A. integrum* (Yesudian and Thambiah 1973), *Haemaphysalis spinigera* (Banerjee 1988) and *Dermacentor auratus* (Ajithkumar et al. 2012) were reported on human beings. There is no report on the occurrence of *Rhipicephalus haemaphysaloides* and *Hyalomma isaaci* on humans. Hence, this is the first human case infested with *R. haemaphysaloides* and *H. isaaci* in Tamil Nadu (India). Moreover, *R. haemaphysaloides* and *H. isaaci* act as a vector for the transmission of Kyasanur Forest Disease (KFD) and Crimean–Congo haemorrhagic fever (CCHF), respectively. Hence, care has to be taken to prevent and control the ticks on animals near human dwellings.

Conclusion

Rhipicephalus haemaphysaloides, *Otobius megnini* and *Hyalomma isaaci* were identified from human being. Infested persons were either working in animal farm (sheep and goats) or tea estate. Few persons without contact with animals also revealed ticks.

Author's contribution CS collection and identification of ticks, collection of literature and preparation of manuscript. KN assistance in literature collection, typing and preparation of manuscript. MAP assisted in collection of ticks and collection of literature.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflicts of interest.

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