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ORIGINAL ARTICLE

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Prevalence and seasonal variation in ixodid ticks on cattle of Mathura district, Uttar Pradesh

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Abstract Considering the economic impact of various ticks species on livestock, the present study was conducted for epidemiological characterize of common ticks infesting Indian zebu cattle between July 2010 and June 2011 period at various locations of Mathura region of India. A total of 2,515 zebu cattle were examined on random basis throughout the year. The overall prevalence of ticks infestation in cattle was 60.07 %. The highest prevalence was reported in September (75 %) while the lowest was in January (46.07 %). On seasonal investigation highest tick infestation was found in rainy season (69.46 %), followed by summer (62.55 %) while lowest in the winter (47.96 %). Overall highest percentage of tick infestations was noticed in the group I animals of less than 1 year age (80.21 %) followed by group II animals of age between 1 and 3 years (68.48 %) and lowest in group III animals of age greater than 3 years (44.85 %). On the basis of morphological studies, two species of ticks were identified namely *Boophilus microplus* and *Hyalomma anatolicum anatolicum*. The most common feeding sites for adult ticks were neck, axilla, belly, groin, udder, perineal regions and tail.

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Introduction

Ectoparasites, mainly ticks, play an important role in all species of domestic animals and pose greater health concerns and about 80 % of world's cattle population is exposed to tick infestation (FAO 1984). Ticks either cause direct losses through tick worry, blood loss, damage to hides and udders, toxin production and body weight loss (Arthur 1962; Sharma 1984; Scholtz et al. 1991; Stachurski et al. 1993) or indirectly through transmission of bacterial, viral and protozoan infections, predisposing for secondary disease condition such as screw-worm myiasis and dermatophytosis (Soulsby 2006) reduction in milk yield and stunted growth (FAO 2004). A single female engorged tick is imposes a daily loss of 0.5–2 ml of blood, 8.9 ml of milk and 1 g of body weight (Minjauw and McLeod 2003; Soulsby 2006). The global economic losses due to tick infestation have been estimated as US $14,000–18,000 million annually and in India it causes annual loss of US $498.7 million (Minjauw and McLeod 2003). Mathura is well known for its cattle and buffalo population. Moreover, the general epizootiological factors make it a favorable hub for various parasitic diseases. The epidemiological determinants like high temperature, humidity, moderate rainfall, adequate water sources aggravate the surplus tick population. Therefore, the present study was undertaken to know the prevalence of ticks in relation to the different month of the year, different seasons of the year, age of the animals, sites of their attachment and identification of ticks up to species level.

Material and method

Area of study

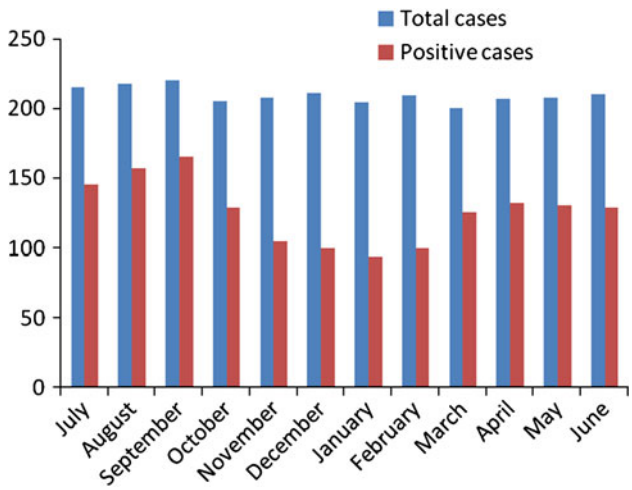
Systematic survey on ixodid ticks of cattle was undertaken at various locations of Mathura district (Uttar Pradesh, India) during the period from July 2010 to June 2011. The selected areas were visited once a week to determine the seasonal pattern of tick infestation and to observe variation in prevalence of tick infestation with respect of host (age, species) and environmental determinants. A total of 485 animals in group I (less than 1 year age), 895 animals in group II (between 1 and 3 years) and 1,135 animals in group III (greater than 3 years) were examined.

Collection and identification of ixodid ticks

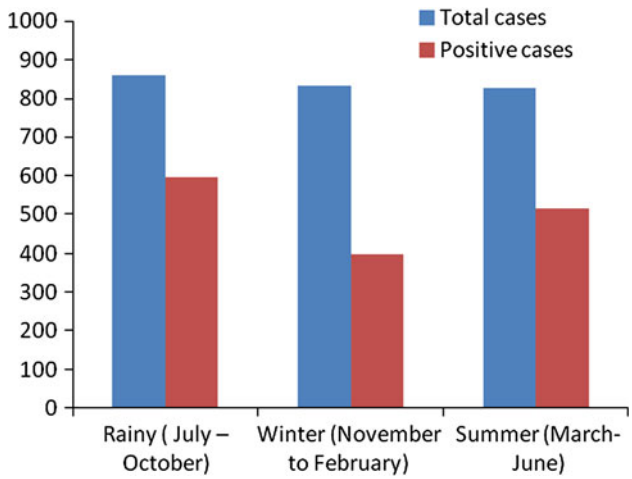
The adult male and female ticks (unengorged and engorged) were gently plucked up from the body of the host by hand manipulation or with the aid of blunt pointed forceps without damaging their mouth parts. The specimens were kept in separate plastic containers with ventilated cap according to host-wise and according to the sites of attachment. Information about the date, host, age, locality and site of collection were entered on the label of each container. These samples were transported to the laboratory of the department of Parasitology, College of Veterinary Science and Animal Husbandry, DUVASU, Mathura for further studies. These ticks were identified using standard keys (Sen and Fletcher 1962; Walker et al. 2003; Soulsby 2006).

Results

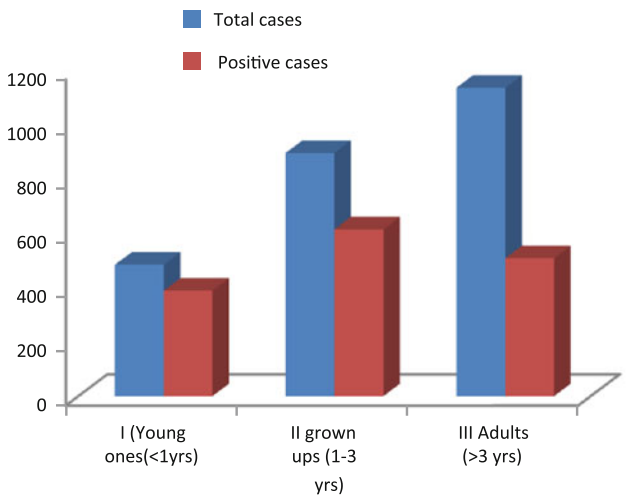
The overall prevalence of ticks during the study period was found to be 60.07 %. The month wise prevalence of ticks throughout the year and the season wise prevalence are given in Graphs 1 and 2, respectively. During the study of age-wise tick infestation, overall maximum percentages of positive cases (80.20 %) were noticed in the group I (up to 1 year) followed by 68.49 % in group II (1–3 years) and minimum tick infestation (44.84 %) was observed in group III (3 ≥ years) (Graph 3). During the study period, ixodid ticks belonging—*Hyalomma anatolicum anatolicum* and *Boophilus microplus* were recorded both in pure and mixed infestation in different seasons. *Hyalomma* spp. infestation was observed in 543 (21.59 %) out of 2,515 cattle examined for tick infestation. Pure infestation of *Hyalomma* spp. was seen in 133 cattle (5.29 %) and mixed with *Boophilus* spp. in 410 cattle (16.3 %). Out of 2,515 cattle examined for tick infestation, *Boophilus* spp. was observed in 1,378 (54.79 %) cases. Pure *Boophilus* spp. infestation was seen



Graph 1 Month wise variation in the prevalence of ticks



Graph 2 Season wise variation in prevalence of ticks



Graph 3 Age wise variation in prevalence of ticks

Fig. 1 Cattle calf infested with ticks

Fig. 2 Adult cow infested with ticks

in 968 cattle (38.49 %). The most common feeding sites for adult ticks were neck, axilla, belly, groin, udder, perineal regions and tail (Figs. 1, 2).

Discussion

During study period, a total of 2,515 cattle were examined from different localities of Mathura district for tick prevalence study and found that overall prevalence of ticks was 60.07 %. Similar finding have been reported by Misra 1984; Kumar 1996; Vatsya et al. 2008; Sajeed et al. 2009. In contrast to present finding Manan et al. (2007) and Vatsya et al. (2007) published that the prevalence rate of ticks in cattle were 20.40 and 41.78 %, respectively. Difference among the results of present and previous study might be due to variation in geographical locations, climatic conditions of the experimental area, region and method of study and selection of samples (Kabir et al. 2011).

Month wise prevalence of ticks was found maximum in September (75 % in cattle) and minimum in the month of January (46.07 %). Similar results were earlier reported by Kumar and Ruprah (1979) and Khan and Srivastava (1994). Sajeed et al. (2009) reported that highest monthly prevalence of ticks in two district of Pakistan was found in July. Lahkar et al. (1994) reported that highest tick activity during November to February and minimum in the month of May to June. The difference in tick infestation in different month may be due to the change in the climatic condition. As in the month of August and September the relative humidity (75.91–78.24 %) and environmental temperature (30.64–28.81 °C) in the area under study is optimum for the growth of tick population.

The present study revealed that the prevalence rate of ticks is highest in rainy season (69.46 %) followed by summer (62.55 %) and least in winter season (47.96 %). Although the animals were infested with ticks throughout the year, the intensity of infection increased following rains. Thus rainfall (humidity) seemed to be an important macroclimatic factor influencing seasonal variation in tick infestation (Vatsya et al. 2007). The decrease infestation rates during extreme winters in the month of December, January and February was sup-positively due to the drop in the temperature (13.02 °C). At low temperature ticks try to protect themselves by entering in diapauses leading to delayed morphogenesis and reduced behavioural activities (Delinger 1985; Gray 1991). Similar observations on seasonal prevalence have been reported by Das (1994a) with a maximum infestation rate (59.28 %) from June to September (rainy season) and minimum (22.78 %) between November and February (winter season). Vatsya et al. (2008) and Kumar (1996) reported that animals were infected with ticks throughout the year with maximum infestation during rainy season, moderate during summer and least during winter season. Contradictory to our findings Islam et al. (2006) found that *B. microplus, Ripicephalus sanguineus, Hyalomma bispinosa* infestation was higher in summer season in cattle of Bangladesh.

While studying the effect of the age of the animal on the infestation rate of ticks it was found that young ones were more susceptible for tick infestation as compared to the adults. Low tick infestation on adults is probably due to resistance acquired following repeated infestations from very early life (Misra 1984; Das 1994b). Similar findings were reported by a large number of workers (Das 1994b; Manan et al. 2007; Vatsya et al. 2007; Kabir et al. 2011). Kabir et al. (2011) reported that young cattle were 2.23 times more susceptible to tick infestation than adult cattle in Pakistan. Contradictory to our findings Razzak and Shaikh (1969) and Yakhchali and Hasanzadehzarza (2004) found that tick infestation was higher in adult cows than in calves.

In present study infestation with pure *Boophilus* sp., and *Hyalomma* sp. were found in 38.50 and 5.29 % cattle, respectively. Members of *Boophilus* sp. of ticks have posses marked specificity for cattle (Arlian and Moher 1987; Dohnen 1987; Papadopoulos et al. 1996). Cattle are more

infested with *B. microplus* probably because of preference of denser hair coat by the tick. Conversely, buffaloes have less dense hair coat and have access to mud for wallowing that might attribute to dropping of ticks and hence less infested with *Boophilus* sp. (Khan 1986). Hiregoudar and Harlapur (1988) also recorded higher prevalence of *B. microplus* on cattle as compared to the buffaloes. Kumar (1996) observed higher prevalence of *B. microplus* on cattle in Mathura district and adjoining regions. Talukdar (1985) reported same species of ticks from cattle except *Hyalomma dromedari* from Mathura district.

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