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STUDIES ON THE VECTOR ROLE OFTICKS IN TRANSMISSION OF PROTOZOAN DISEASES IN CA'ITLE AND nUFFALOES

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The vector role of ticks in transmission of protozoan diseases was studied in cattle and buffaloes. One hundred each cattle and buffaloes heavily infested with ticks were examined for natural infection with protozoan parasites. *Hyalomma anatolicum anatolicum* and *H. marginatum isaaci* ticks were found to be naturally infected with *Theileria annuiata* in cattle, whereas *Boophilus microplus* and *B. annulatus* ticks were infected with *Babesia bigemina* in buffaloes. The vector role of these naturally infected species of ticks was confirmed through experimental transmission of these protozoan parasites in cattle and buffalo calves, respectively.

INTRODUCTION

Ticks have been recognised as important parasites of domestic animals all over the world. They are one of the major health hazards in livestock leading to colossal economic losses. These losses arc inflicted in the shape of lowered producttvhy and mmtality due 10 Iransmission of prolozoan diseases (Gray and Polgieler, 1982; Rick, 1982).

Keeping in view the economic losses, the role of ticks in transmission of protozoan diseases was studied in local conditions. Since the vector status of ticks in transmission of various diseases have not so far been explored in local conditions, therefore, this study would. significantly contribute to the existing knowledge of protozoan diseases.

MATERIALS AND METHODS

The vector role of ticks in transmission of various diseases was studied by detecting naturally infected ticks and by experimental transmission of pathogens.

Natural infection: One hundred each cattle and buffaloes heavily infested with ticks were selected for the collection of ticks. Twenty tieks of each species infesting cattle and buffaloes were examined for the presence of protozoan parasites. The ticks were incised and smears were made from gut contents. Simuhaneously, blood smears were also made from respective animals and a record of Ihe source of Ihe Iicks and blood samples was kept 10 determine the coincidence of protozoan parasites in ticks as well as in blood of animals. These smears were stained with Giemsa's staining method (Benjamin, 1984). The slides were examined microscopically for protozoan parasites.

Experimental t-:unsmission: *Hyalomma anatottcum anatolicum* and *H. marginatum isaaci* tieks were found to be naturally infected with *Thelieria annulata* in cattle, whereas *Boophilus microplus* and *B. annulatus* were infected with *Babesia bigemina* in .buffaloes.

For experimental transmission of *T. annulatq* in cattle hy *H. anatolicum anatolicum* and *H. margillatlll/l isaaci,* 12 cattle calves of almost the same age, breed and weight were used. Blood samples of these calves were screened thoroughly to ensure their parasite free status before the start of

experiment. The calves were divided into three groups viz. A, Band C comprising four calves in each group. All the calves of each group were housed separately. The calves of group A and B were used for experimental transmission of *T. annulata* whereas the calves of group C served as uninfected control. Each of the four calves in groups A and B were infested with 50 *H. anatolicum anatolicum* and *H. marginatum isaaci,* respectively at their nymphal stage* collected from naturally *T. annulatu* infected cattle. Blood samples of all the' calves used for expcrimental transmission and uninIcstcd control were examined for *T. UlllllllIata* daily from day 4-12 post-infestation (PI) with the ticks.

For cxperimental transmission of *B. bigc11lilla* in buffaloes by *B. microplus* and *B. annutatus,* 12 buffalo-calves of almost same age, breed and weight were used. Experimental design 'was similar to that used for transmission of *T: annulata,*

RESULTS

Natural infection: Of the different species of ticks examined from cattle and buffaloes; *T. annulata* was identified from smears made from *H. anatolicum anatolicum* and *H. marginatum isaaci* collected from cattle. *B. blgemina* was identified from the smears made from *B. microplus* and *B. annulatus* collected from buffaloes. *T. annulata* and *B. bigc11lilla* infections were observed both from the ticks as well as blood of cattle and buffaloes, respectively.

*The nymphs used for infestation of experimental calves were assumed to be infected with T. *annulata* because 50 nymphs of each of *H. anatoJicum anatoJicum* and *H. marginatum* isaaci from naturally infected cattle confirmed to be infected through examination of smears made from them.

Experimental transmission: Examination of the blood smears made from the four cattle calves of each group which were experimentally infested with *H. anatolicum anatolicum* and *H. 'marginaturn' isaaci* ticks collected from naturally *T. annulata* infected cattle, revealed the presence of *T. annulata* from day 6-9 PI. None of the blood smear from uninfested control calves PI was positive for *T. annulata* infection.

Exmamination of the blood smears of huffalo calves experimentally infested with *B. microplus* and *B. annulatus* ticks collected from naturally *B. bigcmiu a* infected buffaloes revealed the presence of *B. bigemilla* on day S-X PI. *B. bigcl7lilla* was not detected Irom the blood of uninfcstcd control buffalo calves.

DISCUSSION

During the present investigations, two protozoan parasites viz. *T. annulate* and *B. bigcmilla* were isolated and characterised from ticks of *Hyalomma* and *Boophilus* species infesting cattle and buffaloes, respectively.

transmission of these parasites was confirmed through experimental transmission in cattle and buffalo-calves. None of the other species of ticks infesting cattle and buffaloes were found infected with these protozoan parasites. The vector status of different species of ticks in transmission of various protozoan diseases had been reported by different workers at different times in transmission of various protozoan diseases has been reported by different workers at different times in various regions of the world (Dauhney and Said, 1951; Ashfaque *et al.,* 19X3; Yadav *et al.,* 19H5) have found that *T. annulata* in cattle is also transmitted by *Hyalomma detritum* and *H. SCIIPCIISC*in addition to *H. anatolicum anatolicum,* The reason for the difference may be due to the

absence of these two species of ticks in this area. The vector status of ticks in transmission of *T. annulata* infection has also been experimentally proved by Daubney and Said (1951) and Walker *et al.* (1983). However, the results of Riek (1982) differ from the present study who failed to demonstrate the transmission of theileriosis by ticks *Boophilus, Ixodes* and *Hyalomma.* It could be attributed to the less number of ticks fed on susceptible animals because the transmission of infection depends upon the number of ticks used during the experiment (Barnett and Brocklesby, 1966).

It was proved through experimental transmission that *B. microplus* ticks act as the vector of *Babesia* bigemina infection. Similar results of experimental transmission of *Babesia bigemina* by *B. microplus* ticks have also been confirmed by Callow and Hoytc (1961).

It is a well established fact that ticks arc important vectors of protozoan parasites yet the incrimination of various species of ticks as a vector is quite controversial (Liu *et al.,* 1987). It has been observed in the current study that although 7 species of ticks were found infesting cattle and buffaloes but only 4 species of ticks had *T. annulata* or *B. bigemina,* There is no genuine reason which could be assigned as to why some species of ticks infesting cattle harbour protozoan parasites but others do not. However, similar findings have been reported by Hoogstraal (1972) who has stated that many species of ticks parasitize domestic animals but a few of them achieve high pest status.

Moreover, this can be attributed to all those underlying and undetermined factors which make different tick species specific intermediate host for different protozoan parasite. These factors include feeding habit, food, life cycle, fecundity, etc. etc. of different species of ticks. It is concluded from these results that ticks act as vector of important protozoan diseases in this area.

Anaplasmosis was not recorded from this area. Although, the vector ticks such as *Boophilus microplus, Rhipicephalus .1"011-guineus* and *Dermacentor marginatus* were present in this area, yet no evidence of disease was found. The reason could be that geographical conditions of the area might not he favourable for the development of *Anaplasma* organisms.

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