ENDEMIC IXODID TICK INFESTATION ON BUFFALOES (*BUBALUS BUBALIS*) IN EAST GODAVARI, ANDHRA PRADESH, INDIA

S. Chennuru[1,*], K. Mounika[2] and S. Krovvidi[3]

ABSTRACT

Ticks are one of the important vectors of zoonoses and are major constraint to livestock farming. The present study was carried at East Godavari district, Andhra Pradesh, India, during October 2016 to May 2017 to determine the prevalence of tick infestation on buffaloes. Examination of ticks collected from 420 buffaloes of house hold, organised and unorganised dairy farms from different villages of district revealed 29.52% of tick infestation in the study area. Exclusively *Haemaphysalis* species was identified by processing of ticks in 10% KOH solution by standard parasitological technique. Among different age groups the higher rate of prevalence (10.24%) was noticed in ≤6 months followed by 8.09% in 6 months to 1 year, 5.48% in 1 to 2 years and 5.71% in ≥2 years of age group animals. Statistically there was a significant difference (x^2=16.97, P=0.0007) between the age groups with respect to prevalence of ticks in buffaloes. Subsequently animals were treated with two subcutaneous injections of ivermectin at 200 µg kg^{-1} four days apart. Farther owners were also advised spraying of animal sheds and its surroundings with Amitraz 12.5% emulsifiable concentration. The results of the present study is suggestive of the poor animal husbandry practices pursued by the farmers of the study area which are to be addressed by following appropriate control strategies considering the epidemiology of ticks.

Keywords: *Bubalus bubalis*, buffalo, prevalence, *Haemaphysalis* ticks, treatment

INTRODUCTION

Parasitic infections are acknowledged to be the major restraint to the economy of farmers by reducing the growth and production of livestock. Among parasites ticks are major pests of livestock and are considered next to mosquitoes in the transmission of a many infectious diseases of public health and veterinary importance in addition to their blood sucking habit. In India, tick and tick borne diseases cause an estimated loss of US $498.7 million per annum (Minjauw and McLeod, 2003). The research on tick-borne diseases progressed worldwide after an outbreak of Rocky Mountain spotted fever (RMSF) in the United States that spread to humans by *Dermacentor* ticks. In India, the finding of tick-borne diseases *viz*., Lyme

[1]Department of Veterinary Parasitology, NTR College of Veterinary Science, Andhra Pradesh, India, *E-mail: sdevichennuru@rediffmail.com

[2]Veterinary Assistant Surgeon, Avidi Veterinary Dispensary, Andhra Pradesh, India

[3]Department of Animal Genetics, NTR College of Veterinary Science, Andhra Pradesh, India

disease from Nilgiri Hills of Tamil Nadu (Sharma *et al*., 1992), Kyasanur Forest disease (KFD) in Karnataka (Pattnaik, 2006), tick typhus from Himachal Pradesh (Kumar *et al*., 2011) in humans and Crimean-Congo haemorrhagic fever (CCHF) infection in human and domestic animals from Gujarat and other parts of India (Sharma *et al*., 2012) demand the need of epidemiological studies on these ectoparasites. Although several reports on prevalence of ticks on buffalos have been reported from various parts of India (Shobana *et al*., 2013; Singh and Rath, 2013; Patel *et al*., 2015; Khajuria *et al*., 2015) it is still crucial to carry out epidemiological studies in other parts of country anticipating the change in dynamics of parasitic infections and to follow appropriate control strategies. The infestation of ticks on buffaloes was observed to be endemic in certain areas in East Godavari district, Andhra Pradesh leading to production losses and calf mortality (Mounika, *Personal observation*). Owing to this a study was undertaken to determine the prevalence of tick infestation on buffaloes in East Godavari district of Andhra Pradesh, India and suggest control measures.

MATERIALS AND METHODS

A 6 year old graded Murrah buffaloe in fifth month pregnancy was brought to the Avidi Veterinary Dispensary, East Godavari district with a history of ticks all over the body, loss of hair and pruritis (Figure 1) and owner also reported the problem of tick infestation in the village and surrounding areas. Clinical manifestations included alopecia, pruritis, and small erythematous areas due to rubbing. General clinical examination revealed no apparent changes in body temperature or pulse rates, but was dull and weak. Consequently, the study was carried at East Godavari district, Andhra Pradesh (India), during October 2016 to May 2017 to know the prevalence of tick infestation on buffaloes. Ticks were collected from 420 buffaloes of house hold, organised and unorganised dairy farms randomly from different villages of district. The buffaloes of all age were examined and were grouped into to four *viz*., ≤6 months (100), 6 months to 1 year (100), 1 to 2 years (100) and ≥2 years (120) of age. Each buffalo was examined thoroughly by passing hands over the coat for the presence of ticks and the larva, nymph and adult stages of ticks with intact mouthparts were collected with the help of a forceps and brush by smearing oil. The collected ticks were then transferred to plastic vials containing fixative solution of chloroform in 10% formalin, marked with age and were brought to the Parasitology laboratory at NTR College of Veterinary Science, Gannavaram. Sex of animal was not considered into account. A few of specimens were recognised directly under stereomicroscope and some of them were processed in 10% KOH as per the standard procedure (Soulsby, 1982). Species specific identification was carried based on description keys provided by Kettle (1995). The quantum of infestation among the animals was derived in terms of percentage positive of the total samples examined. Data obtained were classified according to age and were analysed as per standard statistical techniques (Snedecor and Cochran, 1980). Farmers of these areas reported traditional method of applications of neem oil mixed with turmeric powder or turmeric powder mixed with coconut oil or naphthalene balls mixed with turmeric powder and neem oil as topical application for control of these pests. Later on treatment was shifted to frequent applications of available acaricides

particularly deltamethrin and cypermethrin without maintaining an optimum concentration. Subsequently the animals were managed with subcutaneous injections of ivermectin at 200 µg kg^{-1} four days apart. Simultaneously animals were supplemented with oral Ferritas tablets and mineral mixture daily for two week.

RESULTS AND DISCUSSION

In India *Rhipicephalus* (*Boophilus*) *microplus* and *Hyalomma anatolicum* are known to be widely prevalent and economically important ixodid ticks infesting dairy animals (Ghosh *et al*., 2007). In the present study only one species of multi host tick *Haemaphysalis* was identified which could be due to the reality that climatic conditions *i.e*., temperature and moisture of the study area are not favourable for survival and perpetuation of other ixodid ticks. Singh and Rath (2013) also opined that the prevalence of ticks in an area is highly influenced by its macro as well as micro-climate and bionomics of specific ticks in specific areas. All ticks were brevirostrate with rectangular basis capituli and lateral elongation of second palpal segment beyond the basis capituli (Figure 2). Feastoons were not seen in the most of the mounted specimens as many of collected specimens were in engorged state (Kettle, 1995). Likewise examination of 480 buffaloes in Jammu region, India also revealed only *Rhipicephalus* (*Boophilus*) *microplus* (Khajuria *et al*., 2015). Even though *Haemaphysalis* tick infestation may not impact directly the mortality rate in infested animals, reports signify that they are principle vectors of KFD in India (Pattnaik, 2006; Murhekar *et al*., 2015). All the tick infested buffaloes showed alopecia and pruritiswhereas pale mucus membrane and rough hair coat was prominent in calves. Some of the calves were in recumbent stage especially hind limb paralysis observed. Haemoglobin count of the infested animals was observed to be reduced (Figure 3) when tested at animal side using COPACK haemoglobin colour scale kit (COPACK GMBH, Oststeinbek, Germany).

Out of 420 buffaloes examined 124 were positive for tick infestation giving an overall prevalence of 29.52% of tick infestation in the study area. The prevalence of ixodid ticks in buffaloes found to be 58.06% (Shobana *et al*., 2013), 37.29% (Khajuria *et al*., 2015) and 51.81% (Patel *et al*., 2015) from various agro climatic regions across India. The divergence in prevalence could be due to variation in geographical locations, climatic conditions of the study area and method of sample collection. Among different age groups the higher rate of prevalence (10.24%) was noticed in ≤6 months followed by 8.09% in 6 months to 1 year, 5.48% in 1 to 2 years and 5.71% in ≥2 years of age group animals. The lower rate of prevalence in above one year age buffaloes might be attributed to the better management of adult or productive animals by farmers compared to that of young calves in addition to resistance acquired during the life time after repeated exposure to tick infestationas animal ages (Das, 1994). Statistically there is a significant difference (x^2=16.97, P=0.0007) between the age groups with respect to prevalence of ticks in buffaloes. In accordance Singh and Rath (2013); Patel *et al*. (2015); Khajuria *et al*. (2015) also reported higher prevalence in below one year age group.

Though synthetic pyrethroids are effective acaricides, and the rate of development of resistance against the commonly used acaricides in multi-host tick species is slower (Singh and Rath, 2013), share cross-reistance with DDT so that tick populations

containing a small percentage of DDT-resistant ticks rapidly develop specific pyrthroid resistance hence infested animals were managed with injectable ivermectin and their surroundings were managed by formamidines. Nolan *et al*. (1985) also used two subcutaneous injections of ivermectin at 200 µg kg^{-1} four days apart for cleansing tick infested cattle under field conditions. Complete eradication is extremely difficult because of the persistence of ticks, especially multihost ticks, on wild fauna and the ability of adult tick to live for long period off the host (Radostits *et al*., 2000). Further owners were also advised spraying of animal sheds and its surroundings with Amitraz 12.5% emulsifiable concentration as it requires no milk withdrawal period and burning of floors of animal enclosures if possible. The results of the present study evocate that the environmental conditions of East Godavari district are highly conducive to reproduce and continuation of ixodid ticks, further poor farming practices followed by the farmers may be accountable for intensify the situation in bovines. Hence control strategies, acaricidal treatment twice in rainy season and once each in summer and winter seasons should be recommended in order to valid control of tick infestations and to interrupt biological cycles of tick-borne diseases of public health importance.

ACKNOWLEDGEMENT

The authors are thankful to the Joint Director, East Godavari distict and Associate Dean, NTR college of Veterinary science, Gannavaram for the facilities provided for conduction of the study.

Figure 1. Buffalo brisket region infested with ticks.

Figure 2. *Haemaphysalis* sp. Note lateral elongation of palpal segment.

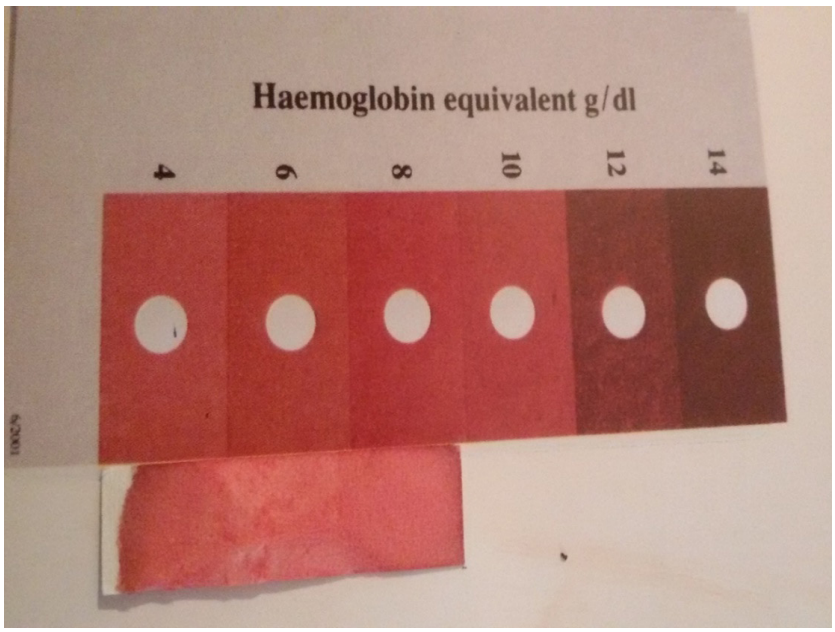

Figure 3. COPACK Haemoglobin colour scale kit.

REFERENCES

Das, S.S. 1994. Prevalence of ixodid tick infestation on farm animals in Pantnagar, tarai of Uttar Pradesh. *Journal of Parasitology and Applied Animal Biology*, **3**: 71-73.

Ghosh, S., G.C. Bansal, S.C. Gupta, D.D. Ray, M.Q. Khan, H. Irshad, M. Shahiduzzaman, U. Seitzer and J.S. Ahmed. 2007. Status of tick distribution in Bangladesh, India and Pakistan. *Parasitol. Res.*, **101**: 207-216.

Kettle, D.S. 1995. *Medical and Veterinary Entomology*, 2nd ed. CAB International, Wallingford, UK. p. 460-461.

Khajuria, V., R. Godara, A. Yadav and R. Katoch. 2015. Prevalence of ixodid ticks in dairy animals of Jammu region. *Journal of Parasitic Diseases*, **39**(3): 418-421.

Kumar, K., N. Balakrishnan and A.K. Sharma. 2014. Studies on the vertical distribution of ticks of domestic animals and their public health importance in Nilgiri Hills and adjoining areas of Tamil Nadu state (India). *International Journal of Zoology*, **2014**: 1-6.

Kumar, K., S.K. Jain and A.K. Sharma. 2011. Outbreak of Indian tick typhus amongst residents of Deol village, district, Kangra, Himachal Pradesh (India). *International Journal of Medicine and Public Health*, **1**(3): 67-71.

Media Scanning and Verification Cell. 2013. Integrated Disease Surveillance Programme, National Centre for Disease Control, Delhi, India.

Minjauw, B. and A. McLeod. 2003. Tick-borne diseases and poverty: The impact of ticks and tick-borne diseases on the livelihood of small scale and marginal livestock owners in India and eastern and southern Africa. *Research Report*, DFID Animal Health Programme, Centre for Tropical Veterinary Medicine, University of Edinburgh, UK. 116p.

Murhekar, M.V., G.S. Kasabi, S.M. Mehendale, D.T. Mourya, Pragya, D. Yadav and B.V. Tandale. 2015. On the transmission pattern of Kyasanur Forest Disease (KFD) in India. *Infect. Dis. Poverty.*, **4**: 37.

Nolan, J., H.J. Schnitzerling and P. Bird. 1985. Use of ivermectin to cleanse tick infested cattle. *Austral. Vet. J.*, **62**: 386-388.

Patel, G., D. Shanker, A. Jaiswal, V. Sudan and S. Verma. 2015. Prevalence and seasonal variation in ixodid ticks on buffaloes of Mathura district, Uttar Pradesh, India. *Buffalo Bull.*, **34**(1): 21-28.

Pattnaik, P. 2006. Kyasanur forest disease: an epidemiological view in India. *Rev. Med. Virol.*, **16**(3): 151-165.

Radostits, O.M., G.C. Gay, D.C. Blood and K.W. Hinchcliff. 2000. *Veterinary Medicine: A Textbook of the Diseases of Cattle Sheep, Pigs, Goats and Horses*, 9th ed. Book Power, London, UK. 1404p.

Sharma, R.S., T. Verghese, R.S. Gupta and D. Chattopadhya. 1992. Epidemiology of Lyme disease in the Nilgiri hills 1992 a premilinary report. *In Proceedings of the 3rd Symposium of Vectors and Vector Borne Diseases*, Haffkine's Institute, Mumbai, India.

Shobana, G., C. Gunasekaran and M. Lena. 2013. A survey on ticks parasites in domestic animals of Villupuram district, south India. *Research Journal of Animal, Veterinary and Fishery Sciences*, **1**(5): 21-23.

Singh, N.K. and S.S. Rath. 2013. Epidemiology of ixodid ticks in cattle population of various

agroclimatic zones of Punjab, India. *Asian Pac. J. Trop. Med*., **6**(12): 947-951.

Snedecor, G.W. and W.G. Cochram. 1980. *Statistical Methods*, 7th ed. The Iowa State University Press, Ames, Iowa, USA. 593p.

Soulsby, E.J.L. 1982. *Helminths, Arthropod and Protozoa of Domesticated Animals*, 7th ed. Bailliere Tindal and Cassell Ltd., London UK. p. 35-740.