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Tick-Borne *Theileria Annulata* Infection in Dairy Cows: A Short Note for Field Vets

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Abstract: ***Theileraia annulata*** **is a blood protozoon and is transmitted by ticks.The disease it causes in dairy cows is termed as 'Theileriosis', a serious constraint in the upgradation programme for high yielding dairy cows which often leads to economic crisis in dairy industry. Blood smear examination and haematology are quick and routinely used diagnostic tests by field veterinarians. A total of 117 cows were screened for *Theileria annulata* infection out of which, 28 were positive for infection. Present note for field vets deals with general clinical aspects of *Theileria annulata* infection in dairy cows.**

Keywords: ***Theileria annulata*****, Ticks, Dairy Cows, Theileriosis.**

I. INTRODUCTION

Theileria annulata, a blood protozoon is transmitted by *Hyalomma anatolicum anatolicum* tick. *Theileria annulata* infection affects immune system of cows leading to increased susceptibility to a number of super infections. Indian dairy farmers or dairy industries are largely dependent on high yielding dairy cows. The disease caused by *Theileria annulata* in dairy cows is 'Theileriosis' and is also termed as 'Bovine Tropical Theileriosis' in tropical areas. Disease represents a wide variety of clinical manifestation in dairy cows. One of the major impacts of *Theileria annulata* infection is significant reduction in milk production *i.e.*, economic loss [1]. High mortality rates are imminent if affected cows are not treated properly and efficiently.

II. EPIDEMIOLOGY

Epidemiology includes four major aspects, *viz.*, geographical distribution, seasonal incidence, prevalence rates and animal susceptibility. Geographical distribution of *Theileria annulata* covers major tropical countries from North Africa and Southern Europe, through the Middle East and across Southern Asia and other countries with tropical climate (e.g., Turkey) [2]. Reports suggest higher seasonal incidence of *Theileria annulata* infection in winter followed by incidence in monsoon and summer [3], however, the disease should be suspected in areas with wide-spread tick populations among dairy cows. Out of 117 dairy cows in our study, 28 cows were reported to have *Theileria annulata* infection. The prevalence varies from region to region and depends on management as well as environmental factors (*i.e.*, agro-ecological and geo-climatic status). Housing pattern-wise prevalence of *Theileria annulata* was reported higher in dairy cows kept in open yards followed by dairy cows kept in kachcha houses and in pakka houses suggesting a unique role of housing practices in disease prevalence. Reports on correlation of age and sex of dairy cows with prevalence of *Theileriaannulata* infection are variable which can be due to numbers of cases selected and location of study. Exotic and crossbred dairy cows are more susceptible to infection than indigenous cattle [4].

III. TRANSMISSION OF *THEILERIA ANNULATA*

The chief vector responsible for transmission of *Theileria annulata* is *Hyalomma anatolicum anatolicum* and other species of ticks belonging to the same genera. As the duration of survival inside a tick's body is shorter, theilerial particles

are capable only of transstadial transmission and not transovarian transmission [1]. The disease can also be transmitted by inoculation of infective blood and tissue suspension made from spleen, lymph nodes and liver of infected animals.

***Lifecycle*:**

Tick-bite on dairy cows leads to release of sporozoites. Sporozoites undergo multiplication in lymphocytes and form Koch's blue body macroschizonts. Diagnosis should be made at this point. Furthermore, these macroschizonts are released into red blood corpuscles (RBCs) forming piroplasms and subsequent parasitaemia. Tick bite at this stage leads to formation of male and female gamete, ookinete or sporozoitesin vector tick. Sporozoites reside in salivary glands of the vector tick and are released in healthy cattle upon tick-bite.

IV. PATHOGENESIS

The incubation period ranges from 10-25 days. Process of schizogony occurs in the lymphoid tissues and leads to hyperplastic changes as well as swelling of lymph nodes. Increase in the body temperature and formation of ulcers on abomasal mucosa are associated with sudden release of macroschizonts in blood stream. Progressive leukocytosis is entirely due to lymphocytes. RBCs show infection and low RBCs count attribute to removal of infected RBCs by spleen and liver and not due to the destruction by parasite. Anemic anemia and dyspnea in acute cases causes death of affected cows.

V. SYMPTOMS

The most common clinical signs are rise in body temperature, enlargement of superficial lymphnode, lethargy, tachycardia, polypnoea, reduced appetite, rough hair coat, decreased milk yield, occasional nervous manifestations, pale to icteric mucous membranes and protrusion of eye ball as well as bulging of supra orbital fossa can also be observedin some cases. *Theileria annulata* also produces cutaneous lesions in calves and it is responsible for heavy mortality [5].

VI. DIAGNOSIS

Diagnosis is based on a series of procedures includinganamnesis, clinical signs, clinical pathology, serodiagnosis and post-mortem findings. History of tick infestation, milk production loss, emaciation; clinical signs of high fever, excess salivations, superficial lymph node enlargement suggest diagnostic approach towards clinical pathology and confirmation of infection. Hematology reveals reduced levels of hemoglobin (Hb), RBCs, packed cell volume (PCV) and mean corpuscular volume (MCV) suggestive of anemic anemia [5].The examination of blood smear stained with Giemsa-stain demonstrates piroplasms in RBCs while lymph node biopsy demonstrates schizonts in lymphocytes. Polymerase Chain Reaction (PCR) is more sensitive for detection of low grade infections in carrier animals [6] than blood smear examination under microscope. In our study, a total of 117 dairy cows were screened for theileriosis by peripheral blood smear examination, lymph node biopsy, PCR, hematology and serology. A highly versatile and sensitive test for detection of antibodies against *Theileria annulata* is Enzyme-linked immunosorbent assay (ELISA) [7]. Significant post-mortem changes include (i) generalized enlargement of lymphnodes, (ii) punched necrotic ulcer on abomasal mucosa, (iii) enlarged spleen with or without hemorrhagic changes, (iv) hemorrhagic serous and mucous membranes, (v) enlarged yellowish liver with degenerative changes,(vi) massive pulmonary edema, and (vii) hyperemia and emphysema of lungs.

VII. TREATMENT

Effective drugs used worldwide for the treatment of *Theileria annulata* infection include buparvaquone, oxytetracycline, diminazine aceturate and halofuginone. Buparvaquone, a second-generation hydroxynaphthoquinone remains the most effective (93-100%) and specific drug for treatment of clinical *Theileria annulata* infection [4] and is given intramuscularly at dose rate of 2.5 milligram/kilogram body weight. Reports suggest concurrent use of oxytetracycline intravenously at dose rate of 20 milligram/kilogram body weight daily for five days and diminazine aceturate intramuscularly at dose rate of 5 milligram/kilogram body weight can improve survival rates [3].Supportive therapy with multivitamin preparations, liver extracts, fluid therapy and blood transfusion in case of severe anemia aids to cure infection.

VIII. PREVENTION AND CONTROL

Control of *Theileria annulata* infection can be done by three ways, *viz.*, chemoprophylaxis, immunoprophylaxis and tick control. In chemoprophylaxis, buparvaquone is currently the drug of choice given intramuscularly at the dose rate of 2.5 milligram/kilogram body weight at the age of 30 days [8]. For immunoprophylaxis, commercially available vaccine can be used for susceptible cattle under field conditions. Control of ticks can be done by three methods, *viz.*, physical methods, use of chemical agents and by use of bio-pesticides. Physical methods of controlling tick populations include burning of pasture at the end of grazing season, rotational grazing, zero grazing for cows, better management practices at industry level, construction of tick-proof house without cracks and crevices and fumigation. Chemical agents such as amitraz, coumaphos, cypermethrin, deltamethrin, dichlorvos, phosmet etc. Biopesticide control of ticks include use of neem products, karanj oil or combination of neem and karanj oil in 1:1 proportion[8].

IX. CONCLUSION

Giving due considerations to the economic loss incurred as well as frequency of cases encountered by field veterinarians, this note provides a brief understanding of clinical aspects of *Theileria annulata* infection in dairy cows for efficientcase management. A large scale survey of subclinical as well as clinical *Theileria annulata* infection is still required for better understanding of epidemiology, transmission pattern and steps to minimize the economic losses incurred. Incidence and prevalence rates of tick infestation in dairy cows is an important area requiring further research in order to understand changes in transmission cycle in correlation with changing climatic conditions.

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REFERENCES

[1] Kivaria F. M. (2006). Estimated direct economic costs associated with tick-borne diseases on cattle in Tanzania. Trop. Anim. Health Prod., 38:291-299

[2] Roy, K. C., Ray, D., Bansal, G. C. and Singh, R. K. (2001). Prevalence and distribution of tropical theileriosis in eastern Turkey. Vet. Parasitol.,133(4): 369-370

[3] Masare, P. S., Bhikhane, A. U., Syed, A. M., Ghoke, S. S. and Awaz, K. B. (2009). Epidemiological and clinico-therapeutic studies on theileriosis in calves. IntasPolivet, 10(1): 289-292

[4] Zahid, I. A., Latif, M. and Baloch, K. B. (2005).Incidence and treatment of theileriosis and babesiosis. Pakistan Vet. J., 25:137-139

[5] Aulakh, G. S. and Singla, L. D. (2006). Clinico-hemtobiochmical observations on bovines naturally infected with Theileria annulata. J. Vet.Parasitol.,20:49-52

[6] Durrani, A. Z., Mehmood, N. and Shakoori, A. R. (2010). Comparison of three diagnostic methods for Theileria annulata in Sahiwal and Friesian cattle in Pakistan. Pakistan J. Zool., 42: 467-472

[7] Gray, M. A., Luckins, A. G., Rae, P. F. and Brown, C. G. D. (1980). Evaluation of enzyme-immunoassay for serodiagnosis of infection with Theileria parva and Theileria annulata. Res. Vet. Sci., 29: 360-366

[8] Kumar, A., Sarup, S., Sharma, R.D., Nichani, A.K. and Goel, P. (1991). Chemoprophylactic efficacy of buparvaquone against bovine tropical theileriosis. Indian Vet. J., 68: 514-516.