Journal of Veterinary Parasitology, 19(1) 2005 : 71-72

SHORT COMMUNICATION

Haematological observations on *Theileria annulata* infection in cattle and buffaloes

K. Muraleedharan*[1], K. Syed Ziauddin[2], P. Margoob Hussain[2], R. Puttabyattappa[2] and S.J. Seshadri[3]
Veterinary Diagnostic Laboratory, (UAS, KDDC),
Mysore-560 011, India

Abstract

Haemogram of cattle (90 per cent crossbred) with natural infection of *Theileria annulata* indicated that the total erythrocytes counts and the haemoglobin levels were low in 31.39 per cent of cattle. The severity of anaemia was not often proportional to the degree of parasitaemia. The total leucocytes counts showed leucocytosis (25.09 per cent) or an inclination towards leucopenia (19.72 per cent) and the differential leucocyte counts indicated lymphocytosis (44.94) and neutrophilia (16.19). Local cattle had marked leucocytosis and buffaloes showed leucocytosis with neutrophilia.

Keywords: *Theileria annulata*, Parasitaemia, Haemoglobin, Blood cell counts, Cattle, Buffaloes.

Introduction

Theileriosis due to *Theileria annulata* is a major health hazard in crossbred cattle causing great economic loss to dairy industry in India. Zebu cattle and buffaloes, though exhibit presence of the parasite in blood, are resistant to *T. annulata* (Bansal *et al.*, 1977). In the present communication, attempts have been made to analyse and correlate the haematological parameters and the parasitaemia with *T. annulata* in naturally infected cattle and buffaloes of the project area of the Mysore Milk Producers' Union (MMPU) of Karnataka State.

Materials and Methods

Samples of whole blood/blood smears from cattle (90% crossbreds) and buffaloes, mostly suffering from pyrexia, were collected or received through the veterinary officers of the MMPU as well as the Department of Animal Husbandry & Veterinary Services. They were processed in the laboratory for the identification of haemoparasite(s) as well as for haematological studies. Of 4,521 blood smears of cattle examined, 798 (17.65%) and out of 525 buffaloes examined, 38 (7.24%) had *T. annulata* infection. Total erythrocytes counts (TEC n=138), haemoglobin (Hb n=656), total leucocyte counts (TLC n=218) and differential leucocyte counts (DLC n=761) of varying number of positive cases depending on type of samples received, were estimated following standard procedures (Schalm *et al.*, 1975). The percentage of infected erythrocytes (parasitaemia) was expressed as + (scanty upto 2%), ++ (mild 2 to 10%), +++ (moderate 10 to 40%), ++++ (high 40 to 60%) and +++++ (very high >60%) after examining 300 erythrocytes from 5-10 different microscopic fields under oil immersion lens.

Results and Discussion

Of the 656 infected cattle, 79.88 per cent had lower (+ and ++) and 20.12 per cent had higher (+++ to +++++) grades of parasitaemia. In spite of having lower grades of parasitaemia, the Hb level was appreciably reduced to <8 g per cent in 31.39 per cent cattle while the corresponding decline in Hb was recorded only in 15.54 per cent in higher grades. The result indicated that cattle with lower grades of infection suffered most. Another analysis of data related on Hb and TEC levels showed that Hb concentration >8 g per cent and the TEC >4 m/cu mm levels were maintained by 45.11 per cent cases whereas 34.58 per cent cattle had Hb and TEC levels below these ranges.

[1]Corresponding author present address: [1]Pranavam, T.C.No. 37/282, Thrikkumaramkudam, Thrissur-680 003, India. E-mail: kandayath@rediffmail.com

[2]Veterinary College, University of Agricultural Sciences, Hebbal, Bangalore-560 024, India

[3]No. 10, Vinayaka Layout, 2nd Main Road, RMV II Stage, Boopsandra, Bangalore-560 094, India

J. Vet. Parasitol. 200-0064-480/$2.50 © IAAVP, India

From the results, it is clear that the prevailing parasitaemia and the severity of anaemia were found not proportional in about one-third cases. Disintegration of erythrocytes resulting in haemoglobinuria and consequent anaemia as observed in babesiosis, rarely occurs in theileriosis since no multiplication of parasites takes place in erythrocytes. Therefore, it is considered that anaemia is caused by factor other than direct destruction of erythrocytes by parasites. Alteration in the antigenicity of erythrocytes due to the entry of parasites, evokes an autoimmune reaction in the body which triggers the removal of infected erythrocytes from circulation by macrophages (erythrophagocytosis) causing anaemia (Schroeder and Ristic, 1968; Hooshmand-Rad, 1976; Dhar and Gautam, 1979; Lal and Soni, 1983; 1985). Lowered TEC and Hb values causing macrocytic hypochromic anaemia was reported in cattle having *T. annulata* infection (Setty, 1969; Dhar and Goutam, 1979; Venugopal, 1983). However, Chengalva Rayalu and Hafeez (1995) recorded positive correlation between the decrease in TEC with the intensity of infection and observed macrocytic normochromic anaemia. In the present investigation, haemoglobinuria was noticed in a few cases as observed by earlier workers (Narasimha Murthy *et al.*, 1968; Gautam *et al.*, 1970).

Analysis of TLC had shown the presence of leucocytosis in 19.72, leucopenia in 6.88 and tendency towards leucopenia in 47.71 and normal count in 25.69 per cent of infected cattle. However, according to Barnett (1968), leucopenia was not observed in *T. annulata* infection in cattle. DLC indicated that 44.94 per cent had lymphocytosis, 1.71 per cent monocytosis, 16.69 per cent neutrophilia, 4.21 per cent eosinophilia, 2.22 per cent with combination of any of the above conditions and the rest 30.23 per cent had counts within normal range. Local cattle (n=71) showed high leucocytosis without appreciable changes in DLC. Various haematological values of buffaloes (n=38) positive for *T. annulata* indicated normal TEC with slight decrease in Hb values, besides the occurrence of leucocytosis with neutrophilia. Sharma *et al.* (1985) reported significant fall in TEC and Hb values with lymphocytosis and neutropenia in infected Murrah buffaloes in Vietnam. As pointed out by Al-Kushali *et al.* (1981), considerable variation in the haematological values of different cases were also observed in the present study and prognosis was predicted to be grave in those cattle that showed very low Hb and TEC values.

Acknowledgements

Authors express sincere thanks to the University of Agricultural Sciences and Karnataka Dairy Development Corporation, Bangalore for the facilities provided with the financial assistance of the World Bank.

References

Al-Kushali, M.N., Al-Dahash, S.V., Mahmoud, G.S. and Joshi, B.P., 1981. Study on haematological parameters in clinical theileriasis in Iraqi cattle. Indian J. Vet. Med., 1: 70-72.

Bansal, G.C., Gaur, S.N.S. and Shaw, H.L., 1977. Note on prevalence and cross transmission of *Theileria annulata* (Dschunkowsky and Luhs, 1904). Pantnagar J. Res., 2: 244-246.

Barnett, S.F., 1968. Theileriasis: In: Infectious Diseases of Man and Domestic Animals. Vol. II, Eds. Weinman, D. and Ristic, M., Academic Press, New York and London. pp. 269-328.

Chengalva Rajulu and Md. Hafeez, 1995. Haematological values in cattle infected with *Theileria annulata*. Indian J. Anim. Sci., 65: 1202-1203.

Dhar, S. and Gautam, O.P., 1979. Observations on anaemia in experimentally induced with *Theileria annulata* infection of calves. Indian J. Anim. Sci., 49: 122-126.

Gautam, O.P., Sharma, R.D. and Kalra, D.S., 1970. Theileriasis in exotic breeds and a Sahiwal calf. Indian Vet. J., 47: 78-83.

Hooshmand-Rad, P., 1976. The pathogenesis of anaemia in *Theileria annulata*. Res. Vet. Sci., 20: 324-329.

Lal, H. and Soni, H.L., 1983. Auto-immune reaction associated with experimental *Theileria annulata* infection. Indian J. Anim. Sci., 53: 654-658.

Lal, H. and Soni, H.L., 1985. Erythrophagocytosis in relation to anaemia in acute *Theileria annulata* infection in cross-bred calves. Indian J. Anim. Sci., 55: 85-90.

Narasimha Murthy, G., Satyanarayana Reddy, J. and Eswaraiah, 1968. A case of theileriasis and its treatment. Indian Vet. J., 45: 358-364.

Schalm, O.W., Jain, N.C. and Carrel, E.J., 1975. Veterinary Haematology, 3rd Edn., Lea and Febiger, Philadelphia.

Schroeder, W.F. and Ristic, M., 1968. Autoimmune response and pathogenesis of blood parasitic diseases. In: Infectious Diseases of Man and Animals. Vol. I, Eds. Weinman, D. and Ristic, M., Academic Press, New York and London. pp. 63-67.

Setty, D.R.L., 1969. Haematological studies in natural cases of theileriasis in cattle in and around Bangalore. M.V.Sc. Thesis, University of Agricultural Sciences, Bangalore.

Sharma, M.C., Pathak, N.N., Hung, N.N., Thuan, H.T. and Vug, N.N., 1985. Prevalence of haemoprotozoan infection in Murrah buffaloes in Vietnam. Indian J. Parasitol., 9: 87-90.

Venugopal, T., 1983. Observations on the relation of morphology of parasites to pathogenesis in bovine theileriasis. M.V.Sc. Thesis, University of Agricultural Sciences, Bangalore.