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DETERMINATION OF PREVALENCE OF MALIGNANT CATARRHAL FEVER BY USING COMPETITIVE INHIBITION ELISA IN DOMESTIC CATTLE

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ABSTRACT

The aim of this study was to determine the seroprevalence rate of Malignant Catarrhal Fever (MCF) in domestic cattle in Konya. In this study, serum samples were collected from 189 domestic cattle from private five farms in Konya and its environment. Competitive Enzyme Linked Immunosorbent Assay (CI-ELISA) was used for detection of antibodies against MCF virus. 23 (12.16%) of total 189 blood samples were found to be seropositive and 166 (87.83%) as seronegative against MCF infection using by CI-ELISA. This is the first time that seroprevalence of MCF have been studied in domestic cattle in Konya.

Keywords: Malignant catarrhal fever; cattle; CI-ELISA.

INTRODUCTION

Malignant Catarrhal Fever (MCF) has been known as a systemic and sporadic viral disease for susceptible animals such as domesticated cattle, sheep, goats, bison, deer, and Water buffalo which causes death to such animals (Crawford et al 2002, Dettwiler et al 2011, Cunha et al 2012). MCF is caused by gammaherpesviruses of the genus macavirus and is most commonly caused by 1 of 2 distincts, but it is closely related gammaherpesviruses belonging to the provisionally named MCF subgroup of ruminant rhadinoviruses (Davison et al 2009). There are 2 forms of MCF as wildebeest associated and sheep associated. Cattle that develop wildebeest-associated MCF are infected with a gamma herpesvirus, alcelaphine herpesvirus 1 (AHV-1), which is carried by wildebeest (Okeson et al 2007, Whitaker et al 2007).

The acute disease is characterized by corneal edema, generalized lymphadenopathy, disorder of central nervous system, high fever, salivation, diarrhea, inflammation and ulceration in the

digestive tract, dermatitis, neurologic disorders, ocular lesions, and widespread inflammation of mucosal surfaces (Heuschele 1988, O'Toole and Li 2014). While pathogenesis of MCF is not well known, histologic lesions in MCF infection are perivasculitis, lymphocytic fibrinoid vasculitis, lymphoproliferation, leptomeninges, fibrinoid necrosis of tunica media (Crawford et al 2002, Keel et al 2003, Foyle et al 2009). Indirect immunofluorescence (IIF) and Enzyme Linked Immunosorbent Assay (ELISA), using AHV-1 infected cells as antigens, are the tests currently in most common use (Wan et al 1988, Li et al 1994, Powers et al 2005).

The aim of this study was to determine the seroprevalence rate of MCF in domestic cattle in Konya.

MATERIALS AND METHODS

Serum Samples Collection

Serum samples were randomly collected from 189 clinically healthy domestic cattle originating from private farms with no history of MCF and with no exposure to sheep in Konya. Blood samples were centrifuged at 2000 g for 20 minutes. All sera were removed and stored at -80^{o}C for until analysis. Sera were tested for evidence of exposure to MCFV by CI-ELISA (Li et al 2001).

CI-ELISA

In the present study, CI-ELISA was used investigate the presence of the antibody against MCFV in selected cattle. Samples were investigated for MCF antibodies with commercial CI-ELISA kit, Veterinary Medical Research and Development (VMRD, Inc., Pullman, USA). We prepared wash solution (PBS +0.1% Tween 20) in our laboratory. The cut off values were noticed. The means OD of the serum samples and controls absorption at 450 nm were determined. The results and data interpretation for the assay were evaluated according to the procedure.

Statistical Analysis

Differences between antibody statuses according to their province were calculated by using chi-square test (Minitab 14.0 Inc., State College, PA, USA). Difference were considered significant when $P<0.05$.

RESULTS

Serum antibody prevalence of Malignant Catarrhal Fever Virus (MCFV) in five private farms is presented in Table 1. The totally MCFV specific antibodies were detected in 23 (12.16%) out of 189 cattle. Serum antibody prevalence's were determined from 2.63% to 21.62% in farms. Higher seroprevalence was obtained from farm 5 when compared to others farm 1, 2, 3 and 4. Serum antibody prevalence's were 2.63%, 5.26%, 13.15%, 18.42% and 21.62% in farms 3, 1, 4, 2 and 5, respectively. The serum of 166 (87.83%) animals reacted negatively.

Table 1. Serum antibody prevalence of malignant catarrhal fever virus in five private farms

Farm No	Number of positive samples/tested	Prevalence (%)
1	2/38	5.26^{b}
2	7/38	18.42^{ab}
3	1/38	2.63^{b}
4	5/38	13.15^{ab}
5	8/37	21.62^{a}
Total	23/189	12.16

a, b: Different letters among farms are statistically significant (P<0.05)

DISCUSSION

Malignant catarrhal fever is a sporadic but frequently fatal and lymphoproliferative viral disease of ruminants (O'Toole and Li 2014). Cattle are the last host in the chain of infection. Significant progress in understanding and controlling of MCFV infections requires much more knowledge of the fundamental properties of the causative agents, their epidemiology, and their interactions with their hosts than currently exists (Li et al 1996, Sood et al 2013). MCV transmission of infection to other species also has been reported to play a major role in adult sheep (Cunha et al 2008). However OvHV-2 can be transmitted by aerosol or contact, especially from less than a year old lambs (Li et al 2001). Dabak and Bulut (2003) to be sold in Turkey during the Feast of Sacrifice, especially by bringing in the same place for 1-2 weeks with each other, held together with cattle and sheep sold after contact among animals, which pushed back by the farmers, pointing to increases in incidence of infection, especially in this period in our country MCFV pointed out that. MCFV infection occurs in all seasons in cattle and can be seen in every age group (Collery and Foley 1996).

In the current research, competitive inhibition ELISA was used to estimate the prevalence of MCFV (Table 1). Serological methods can be used in the diagnosis of MCFV infection as well as virological methods. Serum neutralization (SN), complement fixation (CF), immunofluorescence (IF), immuno-peroxidase (IP), and ELISA tests are the most frequently used methods for the detection of MCFV antibodies (Rossiter 1980, Rossiter and Jessett 1980, Wan et al 1988, Sentsui et al 1996, Decaro et al 2003). The most commonly accepted method of detecting antibody to MCFV infection is the competitive inhibition ELISA. The CI-ELISA has the advantage of being faster and more efficient than the Immunofluorescence Antibody (IFA) (OIE 2008). In general, the CI-ELISA method is frequently shown to be more sensitive than the IFA in detection of herpesviral DNA (Nielsen and Vestergaard 1996). CI-ELISA more useful for initial screening of large samples from possible reservoir species and have many advantages, such as speed, economical, and easy to perform (Müller-Doblies et al 1998).

In this study, serum antibody prevalence of MCFV was determined as 12.16%, whereas 87.83% seronegative was determined (Table 1). In the previous studies, the seropositiviy of MCF in cattle was determined as 13.67 to 17.64% in Turkey (Dabak and Bulut 2003, Yesilbag 2007). In addition, 2% and 17% seropositivities were reported in Germany and Alaska, respectively (Frolich et al 1998, Zarnke et al 2002). Seropositivite of current research was lower some research (Zarnke et al 2002) while it was higher than the other (Frolich et al 1998). However, this value was more similar to previous studies Yesilbag (2007). This low prevalence can be explained that, sampled cattle were not in contact with sheep. But it goes even lower than that determined the results were expected. This rate is derived from sheep flocks which are not combined (12.16%), infection of MCF-one only in sheep bred for cattle, but also an independent risk factor for cattle, suggests that we should not be ignored.

CONCLUSION

MCFV infection may cause significant problem in cattle industry. Currently, there is no vaccine application in this region and no reliable method to treat MCF infection in sick

animals. The primary method to control spread of disease is to prevent contact between carriers and clinically susceptible species. This research center in and around Konya and livestock enterprises in the blood serum samples taken from cattle in terms of MCFV infection with the CI-ELISA was determined by examining for the first time the prevalence of infection in this region. Therefore, the results obtained from this study planned for later studies as a guideline for infection in our region will be MCFV. Additional studies are needed to determine the prevalence of infection in sheep. New information about the incidence of infection should be obtained.

CONSENT

It is not applicable.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the authors.

AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration between all authors. All authors read and approved the final manuscript.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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