

Serological Survey of Foot-and-Mouth Disease in Traditionally Managed Goats of Andaman & Nicobar Islands

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ABSTRACT

Serological exposure to foot-and-mouth disease virus (FMDV) was assessed in traditionally managed goats sampled from different villages of Andaman & Nicobar Islands during September 2014. A total of 81 serum samples from goats (Non-descript, Malabari, and Teressa breed) were collected and subjected to 3AB non-structural protein (NSP) ELISA using the in-house r3AB3 NSP ELISA kit. Only 1 out of 81 animals from Rangachang village was found to be positive suggesting absence of FMD virus circulation in the islands during the recent past. However, the particular seropositive animal needs to be re-sampled and tested again in NSP ELISA to rule out infection. As most of the goats were not vaccinated against FMD, routine prophylactic vaccination to maintain an optimum level of herd immunity against FMD is suggested in the region.

Key words: Foot-and-mouth disease; Goat; Andaman & Nicobar Islands; India.

Ruminant livestock husbandry is a major component of Indian agricultural production systems since time immemorial. Foot-and-mouth disease (FMD) is one of the major endemic trans-boundary livestock diseases of socio-economic importance in India and in other parts of the globe. The disease occurs among all cloven-hoofed domestic and wild animals and is a significant constraint to international trade in live animals and animal products (Clavijo et al., 2004). India is endemic for FMD, where three different serotypes of the virus viz. O, A and Asia 1 are prevalent. When infected with FMDV, unvaccinated cattle and pigs usually develop obvious clinical signs of FMD. However, clinical diagnosis in sheep and goats becomes more difficult because the disease is often mild or subclinical (Pay, 1988). Though sheep and goats comprise the majority of the world's FMD-susceptible livestock, no serious attempts have been made to understand their role in the epidemiology of FMD (Sharma, 1981). The present study was undertaken to assess FMDV exposure in traditionally managed goats in different villages of Andaman & Nicobar Islands.

METHODOLOGY

Located in the South Eastern part of the Bay of Bengal, the Union Territory (UT) of Andaman & Nicobar Islands form the southern-most tip of the Indian sub-continent and has immense collection of natural resources. Livestock is one of the mainstays of economy of the region. The UT has 67, 000 goats as per 2007 livestock census. A total of 81 serum samples from goats (Non-descript, Malabari, and Teressa breed) maintained under traditional husbandry system from different villages of Andaman & Nicobar Islands were collected during the month of September 2014. The goats were mostly unvaccinated against FMD.

Blood samples were drawn from the jugular vein using plain sterile vacutainer tubes and were maintained inclined for about 20 min at room temperature. The serum samples were separated from the clotted blood by centrifugation at 3000 rpm for 15 min, transferred to 5 ml cryo-vials, labeled with specific identifying number and transported in cold chain to the Central FMD laboratory at Project Directorate on Foot and Mouth Disease (PDFMD), Mukteswar, Uttarakhand and

Table 1. The summary of sampled goats during September 2014 and results of 3AB NSPELISA

Sampled village	No. of goats sampled	Goats positive in 3AB NSPELISA	Breed
Rangachang	20	1	All Non-descript (ND) and 1 Malabari
Manglutan	15	0	ND
Port mort	18	0	ND
Garacharma	16	0	11 ND, 2 Teresa, 3 Malabari
Junglighat	3	0	ND
Elephant point	9	0	ND
Total	81	1	

3AB non-structural protein (NSP) ELISA for detection of anti-FMDV NSP antibodies

stored at -80°C until analysis. The summary of sampled goats and results of 3AB NSP ELISA are presented in Table 1.

An indirect ELISA was performed using the in-house r3AB3 NSP ELISA kit (PDFMD, Mukteswar) to assess antibodies against 3AB NSP of FMDV (Mohapatra et al., 2011). The kit reportedly has a diagnostic sensitivity and specificity of 95% and 98%, respectively on goat samples (Ranabijuli et al., 2010). Briefly, 96-well microtitre plates were coated with recombinant 3AB3 protein, and the plates were sealed and incubated at 4°C overnight. Goat test serum samples including the negative and positive control serum were diluted at 1:50 ratio in the diluent buffer and were transferred to the coated plates. The plates were incubated for 1 hr at 37°C followed by three washings at 3 min interval. Subsequently, anti-caprine horse radish peroxidase (HRP) conjugated antibodies were dispensed at 1:20000 dilutions and continued with incubation for 1 hr at 37°C as mentioned earlier. After three washings at 5 min interval, 50µl of substrate solution was dispensed into each well and incubated for 15 min at 37°C. After the enzyme-substrate reaction had developed, 50µl of stop solution (1M H₂SO₄) was dispensed into each well. The optical density (OD) of the controls and samples were measured using a spectrophotometer at 492 nm wavelength. Serum samples producing corrected OD values =40% of that of positive control were scored positive.

RESULTS AND DISCUSSION

FMD serology is usually considered to be the preserve of specialists; as a result countries without sophisticated facilities have tended to rely on this assay. In the present study, only 1 out of 81 goats from Rangachang village showed positive reactivity. Since

this lies within the specificity limit of the test employed, the particular animal should be re-sampled and tested with a panel of NSP ELISA to exclude the possibility of infection. In order to establish absolute freedom from infection, oesophageal-pharyngeal fluid collected from randomly picked goats could further be examined for presence of viral genome by polymerase chain reaction or for virus isolation. During 2010-2012, 65 serum samples of goats from Andaman & Nicobar Islands were analyzed for detection of anti-FMDV NSP antibodies using the same indirect 3AB NSP ELISA, where none of the animals were found positive (Rout et al., 2014). This indicates that the goats of Andaman & Nicobar Islands are not exposed to FMDV in the recent times.

Small ruminants should be given due importance, as FMD epidemics in various countries have previously highlighted their epidemiological significance (Kitching, 1998). Moreover, FMD in goats is frequently mild/inapparent (Pay, 1988), so that the infection can very often go unnoticed. As these animals have an unrestricted access to local cattle population, the interspecies transmission of virus cannot be ignored. This is because, the interspecies interaction in shared grazing areas or along the livestock migratory routes poses threats for undetected virus circulation in small ruminants. As most of the goats were not vaccinated against FMD, further routine prophylactic vaccination to maintain an optimum level of herd immunity against FMD is suggested in the region.

There was an outbreak of FMD in 2005 among livestock in villages of South Andaman immediately after Tsunami in 2004 (Hemadri et al., 2006). Since then the Department of Animal Husbandry and Veterinary Services has been implementing the FMD control

programme (FMDCP) as per the guidelines issued by the Government of India. The prevalence of NSP antibodies in bovine population of Andaman & Nicobar Islands in 2013-14 was 9.2% (Annual Report, PDFMD, 2013-2014); whereas the country average during the same and previous years had remained at approximately 27%. As the islands remain as a geographically isolated region with no recent documented incidence of FMD, comparatively lower percentage of bovine population test NSP-antibody positive which could be a result of gradually waning antibody level in the population evoked during the 2005-outbreak. Stamping out FMD in countries like India is quite unlikely. Hence, the only alternative option of adopting routine and regular vaccination covering both large and small ruminant

population could be suitable. With all the possible management and prophylactic measures, Andaman & Nicobar Islands may in future be declared as an ideal disease-free zone.

CONCLUSION

This present study indicates that the goats of Andaman & Nicobar Islands are almost free from FMDV exposure in the recent years. As most of the goats are not included in the FMD vaccination campaign, routine prophylactic vaccination to build up and maintain an optimum level of herd immunity against FMD is suggested in the region.

Paper received on : September 30, 2014

Accepted on : October 216, 2014

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