

Classical Swine Fever Virus Infection in India: Seroprevalence Study from North-eastern States of India

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ABSTRACT

A pilot study was undertaken regarding the prevalence of classical swine fever virus (CSFV) antibodies sera samples of domestic pigs from two north-eastern states, Meghalaya and Manipur. The samples were received and collected between 2011 and September 2013. A total of 516 serum samples from 2 states of north-east region were tested using commercial enzyme-linked immunosorbent assay (ELISA) kits. The mean prevalence of CSFV antibodies in suspected sera was 45.54% (235/516). State wise prevalence of CSFV antibodies was 52.27% and 38.49% from Meghalaya and Manipur respectively. The high prevalence of CSFV antibodies suggests that the disease is endemic in the country. This baseline data will be of use in the formulation of control and eradication programmes.

Key words: Classical swine fever virus, Seroprevalence, North-eastern India

INTRODUCTION

Classical swine fever (CSF), also known as hog cholera, is a highly contagious viral disease of pigs leading to substantial economic losses which can spread in an epizootic form as well as establish enzootic infections in domestic and wild pig populations. The course of disease can be characterized by a peracute, acute, subacute, chronic, atypical, or in-apparent form in affected pigs (Van Oirschot, 1986). CSF affected regions faces restricted trade worldwide.

Classical swine fever (CSF) in pigs is caused by a small enveloped RNA virus, the CSF virus (CSFV), which belongs to the genus *Pestivirus* within the family *Flaviviridae* along with bovine viral diarrhoea virus (BVDV)- 1, BVDV-2 in cattle and border disease virus in sheep. The genome of CSFV consists of about 12.3 kb single stranded, positive sense RNA which encodes a single open

reading frame of 3898 amino acids capable of coding a 435 kDa polyprotein, that is co- and post-translationally processed by viral and cellular proteases to yield four structural and seven non-structural proteins (Thiel et al., 1991). The genome organization of CSFV like other Pestiviruses is 5'-Npro - C - E^{ms} - E1- E2- P7 - NS2/3 - NS4A - NS4B - NS5B - 3' (Meyers and Thiel, 1996).

India's livestock population is one of the largest in the world with a substantial pig population. Pig husbandry practices followed in the country is still the primitive ones (Nandi et al., 2011). North-eastern (NE) region have nearly 40% of pig population of India (Roychoudhury et al., 2014) and pork consumption is most preferable diet in this region. Pig rearing is an important agricultural activity here in the eight NE states of India. Pig husbandry is a major or additional source of income for low socio-economic group of farmers' in rural areas as a backyard piggery for their livelihood.

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NE region shares a long and porous trans-boundary region with five countries namely China, Bangladesh, Bhutan, Nepal and Myanmar) and is always at a risk of introduction of pig viruses due to legal or illegal trades of pig or /pig products from these countries. NE states with a substantial pig population is also prone to various pig diseases commonly encountered in pig husbandry and CSFV is considered as one of the major obstacles for the growth of piggery in the N.E. states.

CSFV is known to occur in India since 1944 when it was first reported in Aligarh (Krihnamurthy, 1964). Since then several outbreaks has been reported from different parts of India. Vaccination against CSFV is the most efficient method to prevent the disease spread. Only lapinized vaccine is available in India which production cannot met/fulfil the required demand. Due to less-availability of vaccines and proper control programs, CSFV has become endemic in India. Genetic typing studies has shown that sub-genogroup 1.1 is prevalent in India and sub-genogroup 2.2 is emerging (Patil et al., 2010; 2012; Roychoudhary et al., 2014). NE region is having highest share of pig population and always have a threat to incursion of new genogroup through its trans-boundary. In this region also sub-genogroup 1.1 is prevalent and recent reports of sub-genogroup 2.2 were also documented. There are only limited studies/ reports on sero-surveillance of CSFV in this region (Nandi et al., 2011). Therefore this study was undertaken to know the current status of sero-prevalence of CSFV antibodies in two of the NE states namely Meghalaya and Manipur.

MATERIAL AND METHODS

Serum samples were collected from a period of 2011 to 2013, from the two states of NE region, Meghalaya and Manipur. Pig serum samples were also deposited by the respective State Animal Husbandry departments to Animal Health division at ICAR RC for NEH region, for regular screening of infectious agents from the village backyard piggery or pig farms where vaccination against CSFV was not practised. Altogether 264 serum samples from Meghalaya and 252 from Manipur were used in the study. A commercial indirect enzyme-linked immunosorbent assay (ELISA) kit (PrioCHECK® CSFV E^{rns}) was used to test for

CSFV antibodies in collected serum samples as per the manufacturer's protocol.

RESULTS AND DISCUSSION

In the present study, 138 out of 264 serum samples from Meghalaya and 97 out of 252 samples from Manipur were found to be positive against CSFV antibodies. The mean prevalence of CSFV antibodies in these samples was found 52.27% and 38.49% from Meghalaya and Manipur respectively.

In the present study, high prevalence i.e. 52.27% and 38.49% is reflective of the wide spread existence of CSFV disease in these two states of NE. This is also indicative of presence of this disease in other states of NE as there is free passage and trades between all the eight states of NE region. In India only lapinized vaccine is available and this is always in high demand, vaccination is only available and limited to the organized pig farms. The low production and shortfall in supply of this lapinized vaccine, makes it unavailable for marginal and low income group farmers. Due to very less vaccination in the region; outbreaks are often reported from the field or backyard piggery.

In the present study the serum samples were mainly collected from the backyard pig farms and the sero-prevalence of CSFV antibodies reflects the true status of the disease in the region. As in NE region pig rearing is the important agricultural activity and CSFV is considered as a top most problem in the piggery growth, this prevalence data indicates the disease is endemic in the region. Earlier reports from the region have shown 10 out of 11 samples from NE region positive (90.99 %) for CSFV antibodies (Nandi et al., 2011). The present results indicated the endemicity of CSFV in these states and in order to control the disease, regular monitoring and serological testing of pigs is necessary. Recently, CSFV has also been reported from pygmy hog and wild hog from NE region of India (Barman et al., 2012; Barman et al., 2014).

NE states are the highest pork consuming states therefore pork demand is always on high. To fulfil this demand unrestricted entries of pigs and pig products from other states or from neighbouring countries increases the threat of the outbreaks. The strict international trade rules should be implemented in order to restrict the entry of ailing pigs. The current situation demands the efficient

production of vaccine to meet the current demands. Lapinized vaccine cannot fulfil the current demand therefore a cell culture based or sub-unit efficient vaccine is in the urgent demand. To know the disease status of CSFV in other states of NE region, active surveillance is required.

This preliminary study cannot answer the question of how long CSF has existed in the domestic pig population in India, even though first reports of CSF in India had appeared in 1962 (Sapre et al., 1962). Unrestricted animal movements from one state to another contributed for the spread of the disease throughout the country. The current lapinized CSFV vaccine available in India, is not able to fulfil the demand and therefore, there is an urgent requirement for a suitable and efficacious marker vaccine which can meet the required demand and will be helpful in sero-surveillance program in differentiating between infected and vaccinated animals. More surveillance of CSFV is required to provide the baseline data for implementing CSFV control and eradication program.

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