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Sero-prevalence and pathology of important viral pathogens causing reproductive problems in domestic pigs of NE India

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Abstract

The objective of this study was to evaluate the prevalence of antibodies to four economically significant viral pathogens in domestic pigs (porcine Reproductive and respiratory syndrome (PRRS) virus, porcine parvovirus (PPV), swine influenza virus (SIV) and porcine circovirus (PCV2) through a serological study in swine herds of five NE states of India experiencing reproductive problems. A total of 1064 serum samples from pigs were tested for antibody to the above mentioned viruses using a commercial ELISA kit. All farms in this study were farrow-to-finish operations and do not use an all-in-all out system. The obtained results showed the presence of antibodies to PPV (10.15%), PCV-2 (11.56 %), PRRSV (0.84%) and SIV (3.94%) in serum samples. Except Mizoram other four states were seronegative to PRRS virus. Clinical signs in sows and gilts recorded were mostly anestrus, abortion, stillborn and mummified foetuses, small litter size and weak born piglets. A total of 86 foetuses and weak piglets were necropsied from different swine herds. Pathological changes recorded grossly were congestion in the body surfaces, internal organs with accumulation of serosanguinous fluid in the body cavities of some necropsied late term aborted foetuses. PCR confirmation of the tissue samples collected from foetuses and piglets was done for the presence of PCV-2 and PPV by a duplex PCR. The present study demonstrated the extensive circulation of porcine parvo virus and porcine circovirus type 2 among domestic pig populations of NE India. All seropositivity to PRRSV, PPV, PCV2 and SIV is due to natural infection, because neither commercial nor autogenous vaccines were available during the study period throughout the country, indicating that the infection was widespread. This serological survey confirms a significant role of viral pathogens causing reproductive problems in pig population of NE India.

Keywords: Seroprevalence, pathology, reproduction, ELISA, Antibodies, NE India, pig

Introduction

The viruses causing porcine reproductive problems have been identified globally as Parvovirus, porcine respiratory and reproductive syndrome (PRRS) virus, porcine Circo virus, Pseudorabies (PRV), classical swine fever (Hog Cholera) virus, Swine Influenza, Enterovirus, and Encephalomyocarditis virus. Porcine reproductive and respiratory syndrome (PRRS) is recognized as a serious swine disease causing reproductive failure in pregnant sows and gilts. Porcine parvovirus (PPV), porcine circovirus (PCV2) are the most important viral diseases in the global swine industry contribute to serious economic losses causing reproductive failure in swine throughout the world characterized by stillbirth, mummification, embryonic death, infertility syndrome, neonatal mortality and occasionally abortion. PCV2 the causative agent of post-weaning multisystemic wasting syndrome (PMWS) has also been associated with late-term abortions, stillbirths, and nonviable neonatal piglets. Swine influenza virus has also affects on herd fertility and abortions in late pregnancy. In India, limited study has been done so far in sero-surveillance of important viral pathogens associated with reproductive disorder in pigs. The aim of the present study was to perform sero-prevalence study on different pigs farms of north east India to estimate the prevalence of antibodies against some selected swine pathogens mentioned above. The study was aimed at testing sera from domestic pigs for the presence of antibodies to five economically significant porcine infectious disease agents causing reproductive problems: PRRSV, PPV, PCV2, SIV and CSF.

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Materials and Methods

Sampling sites and field necropsies

1064 serum samples were collected from domestic swine herds of five north-eastern states (Assam, Nagaland, Mizoram, Meghalaya, Tripura and Arunachal Pradesh) with the history of experiencing reproductive problems from 2013 to 2016. The serum samples were collected only from sows and gilts. A total of 86 fetuses and weak piglets were collected from different farms and necropsy examination was done thoroughly.

Serological Analyses

A total of 1064 serum samples were collected and were analyzed for presence of antibodies against PRRSV by IDEXX commercial kit (IDEXX, Switzerland). PCV2, PPV, SIV (INGEZIM, Ingenasa, Spain). Commercial ELISA tests were performed according to the manufacturer’s. Detection of specific antibodies classified farm as a seropositive.

Pathological study: Detailed post-mortem examination was conducted on 86 fetuses and weak piglets. Gross pathological changes observed in different organs were systematically recorded. Tissue samples were collected mainly from the developing organs and preserved in 10% formalin solution for routine histopathological examination. After proper fixation the tissues were processed, embedded in paraffin and 4-5µ thick sections were made and stained with Haematoxylin and Eosin for histopathological studies.

Results

A total of 1064 numbers of sera samples were processed for presence of antibody specific to Circo virus type 2, Parvo virus, PRRS virus and Swine Influenza virus. Out of which PCV-2 incidence (11.56%) was more followed by Parvo virus (10.15%), swine influenza virus (3.94%) and PRRS (0.84%). The serological results are presented in Table 1 and Fig.1.

Table 1: sero-prevalence of viral pathogens of ne India

Location	No. Of samples	PCV-2	PPV	SIV	PRRSV
Assam	659	48	49	14	0
Nagaland	112	17	11	7	0
Arunachal Pradesh	72	9	14	5	0
Meghalaya	98	21	19	8	0
Mizoram	67	12	8	5	9
Tripura	56	16	7	3	0
Total	1064	123	108	42	9
Percentage positive (%)		11.56	10.15	3.94	0.84

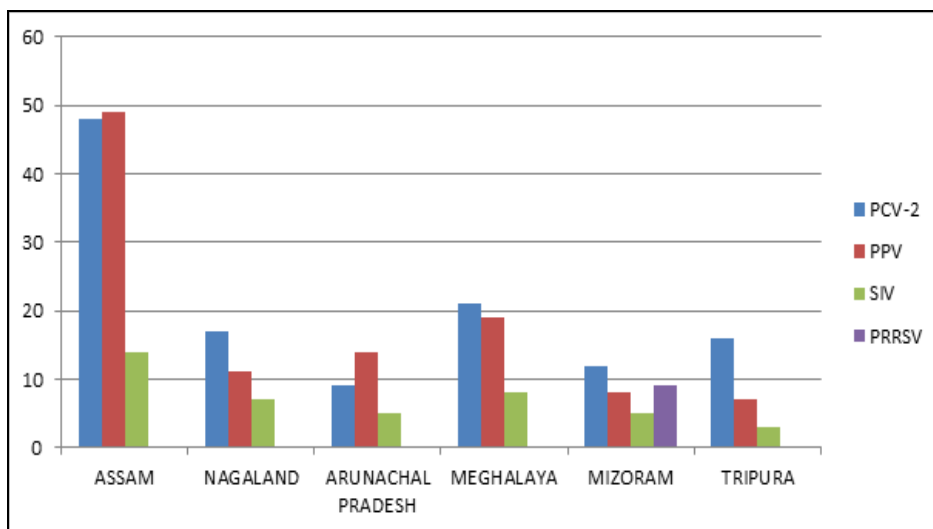


Fig 1: Graph representing seroprevalence of viral pathogens of ne India

Clinical signs in sows and gilts recorded were mostly anestrus, abortion, stillborn and mummified fetuses, small litter size and weak born piglets. In the present study we recorded mummified fetuses along with stillborn fetuses and live born weak piglets (Fig. 2). A total of 86 fetuses and weak piglets were necropsied. Pathological changes recorded grossly were congestion in the body surfaces, internal organs with accumulation of serosanguinous fluid in the body cavities of some necropsied late term aborted fetuses. In few cases fetuses undergo maceration and mummification. The microscopic changes recorded were pneumonic lung, depletion of lymphocyte in the lymphoid organs of piglets, myocardial degeneration or necrosis with oedema were found in some late term aborted fetuses.



Fig 2: Mummified fetuses along with stillborn fetuses and live born weak piglets

Discussion

This serological survey confirms major role of viral pathogens as an important cause of reproductive problems in Indian pigs. PPV and PCV2 are the cause of mass reproductive disorders in sows in the form of abortions, barrenness, birth of mummified foetuses, dead and weak piglets. PRRSV are found to one of the important cause of reproductive disorders in pigs of Mizoram. Results concerning PCV2 confirm ubiquitous character of this pathogen.

Our data indicate that domestic pig populations in NE India are commonly exposed to PPV, PCV2, SIV and PRRSV which could represent a potential threat to domestic swine causing reproductive problems. Obtained results are similar to those given by Chen Q.X. *et al.* for PCV2 in China, Gutierrez-Martin C.B. *et al.* and Lopez-Soria S. *et al.* for PRRSV, SIV in Spanish finishing pigs. Clinical signs in sows and gilts recorded were similar with the reports of earlier workers. The pathological changes recorded in the present study were consistent with those described for parvovirus abortions (West, K.H. *et al.*, 1999) which has previously been implicated as the sole cause of reproductive failure (Altherr B. *et al.*, 2003) [1]. The microscopic changes recorded were pneumonic lung, depletion of lymphocyte in the lymphoid organs of piglets, myocardial degeneration or necrosis with oedema were found in some late term aborted foetuses. Similar lesions were also recorded by earlier worker (West *et al.*, 1999) [9]. reported that PRRSV and PPV are the cause of mass reproductive disorders in sows in the form of abortions, barrenness, birth of mummified fetuses, dead and weak piglets. A reproductive effect of PCV2 has already been described in domestic sows by West KH et al, 1999 with abortion, infected stillborn and non-viable neonate piglets. PRRSV infection can cause resorption, late-term abortions, stillborn and weak piglets in pregnant sows and has been associated with reproductive failure in domestic gilts (Benfield *et al.* 1999) [2]. PPV is an ubiquitous and resistant virus with a worldwide distribution. While in immune adult animals reproductive effects are generally not detected, the tropism of the virus for the reproductive tract may lead to mummified fetuses and resorptions in naive females, especially in their first pregnancy (Mengeling *et al.*, 2000) [7].

Conclusion

The results of the present study indicates that PPV and PCV are widespread pathogens in pig farms having reproductive problems in NE India. This serological survey confirms major role of viral pathogens as an important cause of reproductive problems in Indian pigs.

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