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Research Article

SEROPREVALENCE OF RESPIRATORY DISEASES OF SWINE POPULATION IN PUNJAB

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ABSTRACT

Infectious pneumonia(s) have been shown to cause the greatest economic losses due to disease and mortality in pig. The objective of the present study was to record the seroprevalence of various respiratory diseases of swine viz. mycoplasmosis, pasteurellosis and porcine reproductive and respiratory syndrome (PRRS) in Punjab, India. 90 serum sample(s) from different age groups of pigs were collected from 15 pig farms located in eight districts of Punjab and were evaluated for the presence of antibodies by using commercially available enzyme linked immunosorbent assay kit (ELISA) and standardized ELISA plate. The overall seroprevalence of mycoplasmosis, pasteurellosis and PRRS was 20, 25.5 and 23.3%, respectively. Co-infection of mycoplasmsis, pasteurellosis and PRRS was also recorded. It was concluded that mycoplasmosis, pasteurellosis and PRRS are important respiratory diseases prevalent in swine population in Punjab.

Keywords: Mycoplasmosis, Pasteurellosis, PRRS, Punjab, seroprevalence, swine

Currently, infectious diseases of multifactorial etiology dominate in pig population. Of several diseases, infectious pneumonia(s) have been shown to cause the greatest economic losses in pig houses (Christensen and Mousing, 1992) and it contributes 14% of impact on the total disease expenses (Kliebenstein *et al.,* 1982). Among all, Porcine respiratory disease complex (PRDC) caused by variety of pathogenic agents as virus and bacteria such as porcine reproductive and respiratory syndrome (PRRS) virus, *Mycoplasma hyopneumoniae*, *Pasteurella multocida* etc. are paramount etiological agents which lead to various health problems in growing and finishing pigs of 16-22 weeks of age (Thacker, 2001). PRDC is characterized by slow growth, decreased feed efficiency, lethargy, anorexia, fever, cough and dysponea (Halbur, 1998; Thacker, 2001). Although the etiology of PRDC involves multiple pathogens and varies from farm-to-farm, *M. hyopneumoniae* and PRRSV are two of the most common pathogens isolated from pigs exhibiting PRDC (Dee, 1996; Thacker *et al.,* 1999). There are several serological methods to detect antibodies against *M. hyopneumoniae*, *P.multocida* and PRRS virus, the most frequently used tests are the indirect hemagglutination (IHA), hemagglutination inhibition (HI), complement fixation (CF) test, immunofluorescent antibody test (IFA) and enzyme-linked immunosorbent assays (ELISA) (Ross, 1992; Yahara *et al.,* 2002). Therefore, the seroprevalence studies of *M. hyopneumoniae*, *P. multocida* and PRRS virus were done in swines from different swine farms in Punjab, India.

MATERIALS AND METHODS

Sample Collection

The experiment was carried out in accordance with the guidelines of Institutional Animal Ethics Committee. Blood samples were collected form 90 adult pigs from 15 swine farms located in eight districts of Punjab viz. Bathinda, Ferozpur, Ludhiana, Moga, Mohali, Nawanshahr, Patiala, and Sangrur. There was no history of vaccination against any of the pathogen included in study. Total swine population of these selected farms was 800, out of which 90 (approximately 11%) were selected randomly (Table 1), the sample population included 19 males and 71 females. About 5 ml of blood was collected aseptically from each animal, from ear vein in anticoagulant free vacutainer tubes and transported to laboratory on ice. The serum samples were separated by centrifugation at 3000 rpm for 10 min and stored at -20°C till further use for testing.

Serological examination

All the samples were tested for antibodies of *M. hyopneumoniae* (blocking ELISA kit, Ingezim) and PRRS (Indirect ELISA kit, Ingezim) using commercially available ELISA kits and *P. multocida* (Indirect ELISA) by standardized ELISA plate, using own raised hyperimmune sera. The optical density (OD) for control and samples were measured at 405 nm for *P. multocida* and PRRS, and at 450 nm for *M. hyopneumoniae* in microplate reader (Multiskan, Lab systems, USA). Percent positivity (PP) was calculated as per manufacturer's protocol (Ingezim).

Statistical Analysis

The proportions of the animals that were serologically positive for *M. hyopneumoniae, P. multocida* and PRRS virus were calculated. The proportions for 95 % confidence intervals (95 % CI) were computed as CIs for proportions with binomial data employing no continuity correction.

RESULTS AND DISCUSSION

In Punjab, this is the first report on seroprevalence study of respiratory diseases of swine i.e. Mycoplasmosis, Pasteurellosis and PRRS (Table 2). In the present study, the serological screening detected an overall of 18 (20%, 95% CI 11.74 –28.26) out of 90 samples seropositive for *M. hyopneumoniae* by employing ELISA detection kit,

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Table 1
District-wise collection of serum samples in Punjab

S. No.	District	Location of farm	Total pigs	No. of samples collected	No. of females	No. of males
1.	Ludhiana	Kumbkala and Jordey	74	7	5	2
		Doraha	43	3	2	1
		Village Jhand	37	6	4	2
		Transport Nagar	29	2	2	0
2.	Patiala	Patiala	59	9	8	1
		Patiala	36	4	4	0
3.	Nawanshahr	Phillaur	38	6	5	1
		Kartarpur	40	4	2	2
4.	Mohali	Mohali	63	8	7	1
5.	Bathinda	Govindpura	72	8	6	2
		Talwandisabo	38	5	5	0
6.	Sangrur	Sangrur	53	7	5	2
7.	Ferozpur	Village Maur	80	10	7	3
8.	Moga	Takhnikalan	90	6	5	1
		Mandurile	48	5	4	1
		Total	800	90	71	19

Table 2
Seroprevalence of *M. hyopneumoniae, P. multocida* and PRRS

S. NO.	Disease	Seropositivity (out of 90)	Seroprevalence in boars (19)	Seroprevalence in sows (71)	Farm seropositivity
1.	*M. hyopneumoniae*	18 (20%, 95% CI 11.74–28.26)	15.79% (3/19)	21.13% (15/71)	26.7% (4/15)
2.	*P. multocida*	23 (25.5%, 95% CI 16.5–34.5)	31.58% (6/19)	23.94% (17/71)	46.7% (7/15)
3.	PRRS	21 (23.3%, 95% CI 14.57–32.03)	26.31% (5/19)	22.53% (16/71)	53.3% (8/15)

with nonsignificantly higher seroprevalence in sows than in boars (Chi square= 0.267, P=0.605). Seroprevalence of *M. hyopneumoniae* was found in three districts (Ludhiana, Patiala and Ferozepur). This is in consonance with the results of other studies (Vengust *et al.,* 2006; Sibila *et al.,* 2010) with seroprevalence of 21% and 21.5%, respectively. Higher seroprevalence was found in sows (21.13%) than in boars (15.79%) in contrast with the earlier study (He *et al.,* 2011) that reported higher seroprevalence in boars (68.8%) than in sows (54.5%). This variation in seroprevalence may be due to various controlling strategies of disease such as housing type, herd management, air quality etc. (He *et al.,* 2011). Further number of boar samples was also less in the present study.

Table 3
Co-infection of *M. hyopneumoniae*, *P. multocida* and PRRS

Coinfection	No. of seropositive animals
MYC+PRRS+PAST	1 (1.1%)
MYC+PAST	5 (5.5%)
MYC+PRRS	2 (2.2%)
PAST+PRRS	9 (10%)
TOTAL	17

In total, 23 (25.5%, 95% CI 16.5–34.5) out of 90 samples were found seropositive for *P. multocida* with nonsignificantly higher seroprevalence in boars than in sows (Chi square= 0.459, P=0.498). Seroprevalence of *P. multocida* was recorded in five districts (Ludhiana, Patiala, Bathinda, Sangrur and Ferozpur). The overall seroprevalence of *P. multocida* in the present study was similar to that described by Muro *et al.* (2013).

Serological screening detected 21 (23.3%, 95% CI 14.57–32.03) out of 90 samples seropositive for PRRS virus (Fig. 1), with nonsignificantly higher seroprevalence in boars than in sows (Chi square= 0.234, P=0.629). Seroprevalence of PRRSV was found in five districts (Ludhiana, Patiala, Bathinda, Moga and Ferozpur). Seroprevalence of PRRS virus observed in the present study was not in agreement with earlier reports (Cheon *et al.,* 1997) with over all seroprevalence of 45.2% and, 69.4% herd seropositivity. This variation may be due to different sample size i.e. large number of swines (2132) (Cheon *et al.,* 1997) involved in the earlier study.

Co-prevalence of *M. hyopneumoniae* with *P. multocida* and PRRSV was observed in three out of four (75%) seropositive farms. Co-prevalence of *P. multocida* with *M. hyopneumoniae* and PRRSV was observed in 6

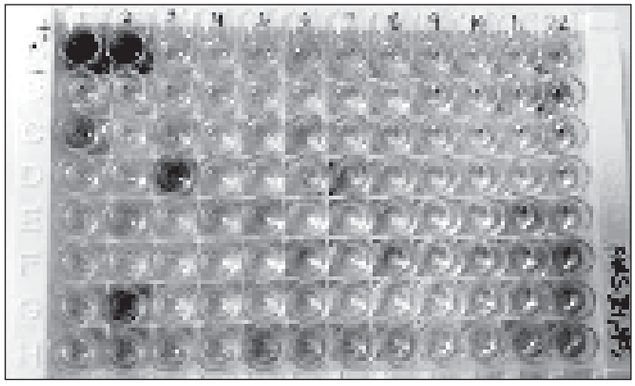

Fig. 1: ELISA plate showing positive cases of PRRSV.

out of 7 (85.7%) seropositive farms. Co-prevalence of PRRSV with *P. multocida* and *M. hyopneumoniae* in 6 out of 8 (75%) seropositive farms was also observed. Out of 90 samples, co-infection of *Mycoplasma hyopneumoniae* (MYC)*, P. multocida* (PAST) and PRRS was found in 17 cases (Table 3). This coinfection may be due to presence of PRDC involving many etiological agents.

It was concluded that mycoplasmosis, pasteurellosis and PRRS are important respiratory diseases prevalent in swine population reported for the first time in Punjab. Thus, this seroprevalence study of respiratory diseases proved the importance of determining the sero-epidemiological status of Punjab, India which may further serves as a support to take effective strategies and measures in prevention or control of diseases.

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