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Research Article

Sero-Prevalence of Brucellosis in Pigs of Bhaktapur, Kavre and Banke Districts of Nepal

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Abstract

Brucellosis; a zoonotic disease which is caused by *Brucella* sp. viz; abortus, melitensis, ovis, canis, suis, in Nepal is regarded as one of the occupational and public health hazards for veterinarians, animal attendants, dairy man, slaughter-house workers, butchers and meat sellers. This study aimed to determine the prevalence of brucellosis in pigs of Bhaktapur, Kavre and Banke districts of Nepal. Serum samples of 231 pigs were collected purposively of which, 78 samples were from Bhaktapur, 85 from Kavre and 68 from Banke districts. Blood samples were collected from the jugular vein of the pigs and were centrifuged to separate the serum from the blood. The separated serum samples were stored at -20°C in the NARC lab till the test was done. Out of 231 samples, 3.90% (9/231) of samples were found to have sero-positivity towards brucellosis by using indirect ELISA test through ID Vet iELISA kit 2016. Fisher exact test was used to find association between variables. There was no significant differences ($p>0.05$) on sex-wise prevalence. This study shows a potential threat to the public health sector of the country along with the degradable impacts on animal health including the economy of farmers. Thus, timely implementation of appropriate preventive and control strategies should be adopted to eradicate the disease.

Keywords: Brucellosis; swine; prevalence; iELISA test; zoonosis

Introduction

Nepal, remaining a predominantly agrarian economy, shares 35% of the GDP (MOAD, 2014) of which livestock subsector accounts for 24% (ADS, 2014) of total AGDP. Livestock plays a crucial role in human food and nutritional security, livelihood, regional balance, gender mainstreaming, and rural poverty alleviation (ILO, 2004). However, the occurrence of livestock diseases can have degradable impacts on animal health including the economy of farmers (Subedi *et al*., 2016).

Among the different diseases of livestock in global scenario, Brucellosis is one of the emerging zoonosis (Corbel, 1997). It affects a range of different mammals including man, cattle, sheep, goats, swine, rodents, elks, whale, crustaceans, etc (Cutler *et al.*, 2005). Brucellosis in pigs is caused by *Brucella suis* biovar 1, 2 and 3 as major causative agents and also by *Brucella abortus* (Quinn *et al.*,

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1998). It is characterized by abortion, orchitis, still birth, even birth of weak piglets, epididymitis, hygroma, infertility, spondylitis of the lumbar and sacral regions especially with occasional paralysis of hind limbs and rarely arthritis in swine (Megid *et al.*, 2010; Onunkwo *et al.*, 2011; Praud *et al.*, 2012).

Brucellosis is an infectious disease usually spreading through genital and digestive systems. *Brucella* is excreted by infected pigs in urine, sperm, nasal and ocular secretions, milk, placenta, lochial secretion, aborted foetus and content of subcutaneous abscesses. Transmission occurs via consumption of these contaminants or feed contaminated by them (Kebede *et al.*, 2008). Coital transmission has also been reported (EFSA, 2009). Transmission occurring through broken skin, conjunctiva, and inhalation seem to be of less epidemiological significance in pigs. Infected piglets may reach weaning age without becoming infected with this economically devastating disease. Initial bacteremia can persist for up-to 3 months. Majority of infected pigs were reported to recover within 6 months however; many remain permanently infected (OIE, 2009).

B. suis contains more diverse isolates than any other species and also have broader host specificity. *B. suis* biovars 1, 2 & 3 are maintained in pigs, European hares are also a reservoir of biovar 2. Biovar 4 affects reindeer and caribou and was formerly known as *B. rangiferi*. Biovar 5 occurs in rodents. Similarly, *B. suis* biovar 1-4 affects human but biovar 5 have not been linked to human disease.

Both the symptomatic and asymptomatic boars can shed *B. suis* in their semen lifelong. *Brucella* can withstand drying, especially when organic material is present and can survive in dust and soil. In case of high humidity, low temperature and absence of sunlight these organisms remain viable for longer period in water, manure, wool, hay, equipment, clothes and aborted foetus.

Methodology

Site of Study

The study was conducted in different farms and households of Bhaktapur, Kavre and Banke districts of Nepal, during September 2016 to February 2017.

Field Survey

A questionnaire survey was also done on these farms regarding owner's name, number of pigs, age, sanitation, feeding system, vaccination status, purpose of rearing, waste management, disposal of carcass, history of abortion, etc.

Sampling Population, Sample Size and Sampling Procedure

According to MOAD, 2014

Total pig population of Nepal: 1,190,138

Pig population in Bhaktapur: 4,786

Pig population in Kavre: 13,795

Pig population in Banke: 2,461

The sample size was calculated using Epi info, StatCal keeping 2.5% prevalence for Bhaktapur and Kavre (Khanal, 2009) and 7.18% for Banke (Shrestha *et al.*, 2008) and the required sample size was found to be 37 for Bhaktapur, 38 for Kavre and 98 for Banke.

But, the sample size collected was 78 from Bhaktapur, 85 from Kavre and 68 from Banke using purposive sampling method.

Collection of Samples

A total of 231 samples were collected from Bhaktapur, Kavre and Banke. 3-5 ml of blood was taken from the jugular vein of pigs and was collected into plain blood collection tube coated with clot activators and the tubes were inverted 3-5 times once. Blood clotting time is 15-30 minutes.

Serum Separation

The clear serum from the tubes were transferred to the serum vile using micro-pippette and some of them not having clear serum were centrifuged at 10,000 rpm for 5 minutes. The obtained serum samples were stored at -20°C.

Testing of the Samples

The serum samples stored were tested by iELISA test through IDvetiELISA kit 2016. Those samples and reagents of the test were first allowed to come at room temperature before use and they all were homogenized by Vortex.

Results

Overall Prevalence

Out of 231 samples collected, 9 samples were found to be positive for brucellosis in pigs using iELISA test revealing **3.90%** sero-prevalence (Fig. 1).

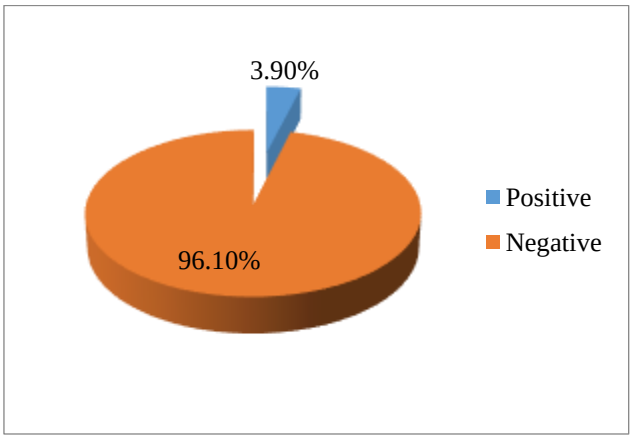

Fig. 1: Overall sero-prevalence of swine brucellosis in Bhaktapur, Kavre and Banke districts, Nepal

District Wise Prevalence

Higher prevalence was found in Kavre followed by Banke, while there was no prevalence in Bhaktapur (Fig.2).

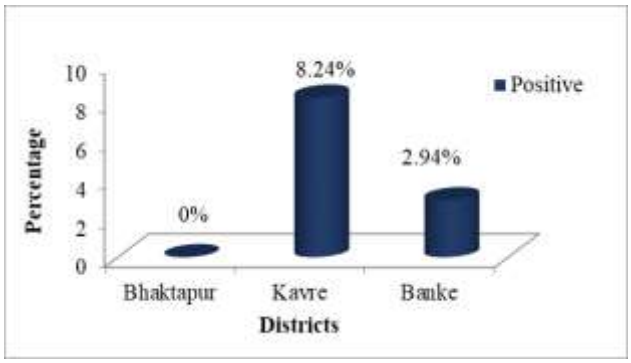

Fig. 2: District wise prevalence of swine brucellosis

Age Wise Prevalence

lt reveals that greatest chances of the infection are for pigs of age 12 and above months (17.65%) followed by less than 3 months (9.09%), 9-12 months (5.26%), 6-9 months (4.35%) and none in 3-6 months of age (Fig. 3).

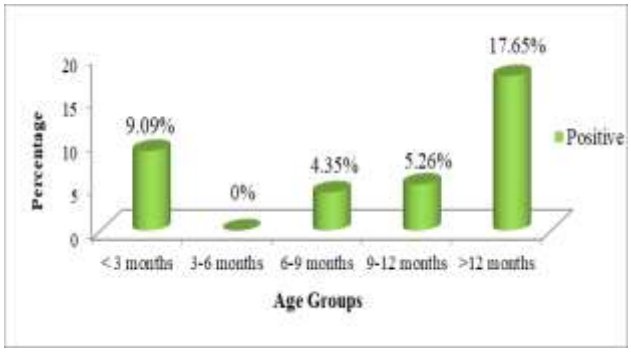

Fig. 3: Age wise prevalence of swine brucellosis

Sex-Wise Prevalence

The sero-prevalences of swine brucellosis are found to be 11.11% in male whereas 3.29% in female (Fig 4).

Interpretation: As P>0.05, the result is not statistically significant (i.e. P=0.2979). Hence, both sexes have equal chance of getting infection.

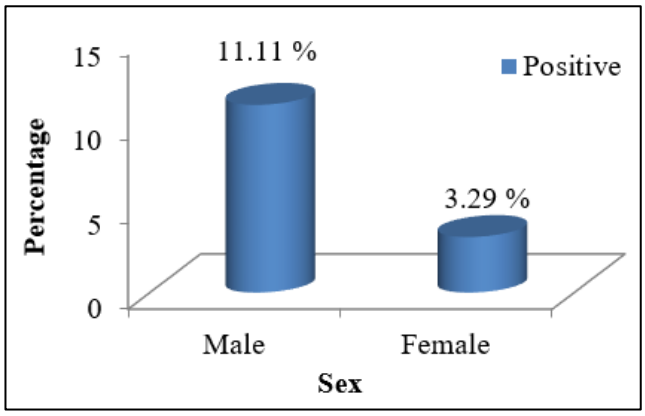

Fig. 4: Sex-wise prevalence of swine brucellosis

Discussion

The sero-prevalence of brucellosis in pigs of Bhaktapur, Kavre and Banke was found to be 3.90%. Similar researches were conducted in different parts of other countries too.

The finding of our study is higher than the finding 2.52% brucellosis in pigs of Kathmandu valley by Khanal (2009) which may be due to the different locations.

On the other hand, it is quite contrast to the finding of Joshi (2005), which revealed 21.58% of the serum samples tested were found to be positive. This is very high and the difference may be because his research was conducted on slaughtered pigs in contrast to ours done on live ones, also he used card test while we used iELISA test.

Higher prevalence in Kavre may be due to the cold climate which favours the growth of *Brucella* organisms. According to Poudel *et al.*, (2014), females showed higher prevalence (15.09%) than that of males (12%) which is quite contrast to our finding where male showed higher prevalence. This difference may be due to the distorted sample of males and females. The finding of our study shows higher prevalence for pigs more than 1 year of age which is supported by Poudel *et al.*, (2014).

Conclusions

3.9% of pigs of Bhaktapur, Kavre and Banke were infected with brucellosis on iELISA test. The test kit has high sensitivity and high specificity. The pigs more than 1 year of age showed higher prevalence as compared to others. Both the males and females have equal chance of getting infection.

This study shows a potential threat to the public health sector of the country along with the degradable impacts on animal health including the economy of farmers. Thus, timely implementation of appropriate prevention and control strategies should be adopted to eradicate the disease.

Although the study was done on the particular areas, it also shows the general condition of the country and will be helpful to conduct further researches and diagnostic procedures to know the status, prevention and control of brucellosis.

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