



## RESEARCH PAPER

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## Bovine viral diarrhoea virus and associated risk factors sero-prevalence in dairy herds of Khyber Pakhtunkhwa (KP), Pakistan

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### Abstract

Bovine Viral Diarrhoea (BVD) is one of the most frequent and economically important viral infections in cattle in various countries around the world. The purpose of the study was to investigate the sero-prevalence of BVD virus and associated risk factors in dairy herds of Khyber Pakhtunkhwa province. In the present study, total of 300 blood samples were screened, among these 38 blood samples were for both cattle and buffaloes population. Sero-prevalence was found higher in cattle (18%) as compared to buffaloes (7.33%). As a whole 12.66% sero-prevalence of BVDV was detected in the tested animals. Data was statistically analyzed by using chi square test. It was observed that isolation of newly purchased animals ( $P=.014$ ), workers visiting other farms ( $P=.013$ ), mixed farming ( $P=.015$ ) and veterinary services ( $P=.009$ ) were potential risk factors associated with BVD virus. Distinctive consideration should be given for addressing identified risk factors of this viral infection like to check the status of before allowing entry of newly purchased animals into herds, discouraging the workers visiting other farms, mixed farming, veterinary services and encouraging culling of animals with more history of abortion.

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## Introduction

Bovine Viral Diarrhea (BVD) is dignified one of the most common and economically most significant viral contagions in cattle in several countries of the world (Gunn *et al.*, 2005). It belongs to genus *Pestivirus* and Flaviviridae family and positive sense RNA virus containing genome of 12.3 kilo bases pair respectively, most frequent and widespread pathogens of dairy animals in all over the world (Becher *et al.*, 2003). In Pakistan, livestock donates around 45 billion liters of milk and is the 4th biggest milk producing country of the glob (Goharet *et al.*, 2013). Epidemiological inquiries have indicated an occurrence of 0.5 to 02 % of BVDV perseverance in the bovine population in diverse countries of the globe. It is connected with gonads, lungs and stomach diseases of cattle. Moreover, this virus can also produce contagions in sheep, goats, camels and pigs, etc. (Vilcek and Nettleton, 2006).

The estimated occurrence of BVD virus in Australia cattle herds was recorded to be a higher with range of 82 to 100 percent respectively (Mackay *et al.*, 2002). While recorded different varied situations, a seroprevalence of 75 to 85 percent of BVD virus antibody in mature cows was recognized in Australia (Lanyon and Reichel, 2014). Thailand and Argentina have also documented a BVD virus occurrence of 70 to 73 percent, respectively (Taylor *et al.*, 2006). In India the estimated occurrence was documented with percentile range of 24.7 respectively from smallholder dairy camps (Kampa *et al.*, 2004). Similarly chief viral illnesses comprise calf diarrhea produce by rotavirus contagions, corona, virus and calici virus respectively. Additionally other diseases like infectious bovine rhinotracheitis (IBR), BVD, bovine ephemeral fever (BEF) and blue tongue. Mostly other major protozoan diseases like babesiosis, anaplasmosis and theileriosis. Among these causal issues, BVD virus is occupied up globally as a silent murderer of dairy animals (Wegelt *et al.*, 2011). In Khyber Pakhtunkhwa province, livestock farmers are also importing these cattle and they also face reproductive problems in their animals. Therefore, the study was aimed to detect the BVD virus and their risk factors in buffaloes

and cattle of the selected areas of Khyber Pakhtunkhwa Pakistan.

## Materials and methods

### *Study area*

The current short duration of 3 months study of cattle and buffaloes population was conducted in different areas of Khyber Pakhtunkhwa including districts of Peshawar, Kohat, Bannu and Dera Ismail Khan.

### *Data and Blood samples collection*

The designed performa was filled by interviewed of cattle and buffaloes owners.

The performa containing parameters like sex, age, breed, abortion, repeat breeding and any other reproductive disorder and other risk factors associated with BVD virus etc. 5 ml of blood samples of cattle and buffaloes were collected from the Jugular vein randomly. After the blood samples were kept in EDTA tubes to avoid clotting and brought to the university of veterinary and animal sciences Lahore laboratory for further analysis.

### *Serum separation*

The serum was then pipetted out into sterilized centrifuge tube and then spun at 4C at 2500g. The aliquots of serum samples were then stored at -20°C in pre-labeled and pre-sterilized centrifuge tubes for further processing.

### *Antibody detection for BVD virus*

All the serum samples of cattle and buffaloes were taken to check the status of antibody against BVD virus through commercially available antibody captured ELISA kit (IDEXX, USA). The kit was purchased from the local sole distributor of the company.

### *Statistical analysis*

The Chi-square analysis was performed to detect the factors that were significant. The factors having  $p \leq 0.05$  were considered significant while factors having  $p \geq 0.05$  were non-significant. All statistical analysis was performed using the SPSS software.

## Results

In the present study total of 300 blood samples were screened, among these 38 blood samples were for both cattle and buffaloes population. Sero-prevalence

was found higher in cattle (18%) as compared to buffaloes (7.33%). As a whole 12.66% sero-prevalence of BVD virus was detected in the tested animals (Table 1).

**Table 1.** Sero-prevalence of BVD virus in dairy herds.

Animals	Total samples	Positive samples	% positive samples	Negative samples	%negative samples
Cattle	150	27	18.00	123	82.00
Buffaloes	150	11	7.34	139	92.66
Total	300	38	25.34	262	174.66

Districts wise prevalence of BVD showed that the totals of 150 positive cattle were recorded. Highest prevalence (30%) of BVD virus was found at district Bannu followed by Dera Ismail Khan (23.33%),

Peshawar (16.66%), Kohat (13.33%). The lowest prevalence (6.66%) of BVD virus was observed at district Mardan (Fig. 1).

**Table 2.** Risk factors associated with BVD virus in dairy herds.

Variable	Category	No	BVD virus ELISA results		
			Negative %	Positive %	P value
Herd size	Small	13	9(69.23)	4(30.76)	0.700
	Medium	11	9(81.81)	2(18.18)	
	Large	6	5(83.33)	1(16.66)	
Veterinary service	Yes	26	22(84.61)	4(15.38)	0.009
	No	4	1(25)	3(75)	
Mixed farming	Yes	20	18(90)	2(10)	0.015
	No	10	5(50)	5(50)	
Usage of disinfectants	Yes	18	14(78)	4(22)	0.860
	No	12	9(76)	3(24)	
Methods of cleaning	Not practiced	10	9(90)	1(10)	0.469
	Sweeping	17	12(70.58)	5(29.41)	
	Water hosing	3	2(66.66)	1(33.33)	
Workers visiting other farms	Yes	22	20(90.90)	2(9.090)	0.013
	No	8	4(50)	4(50)	
Preparation of food in the farm	Yes	12	9(76)	3(24)	0.860
	No	18	14(78)	4(22)	
Source of water	Well	22	18(80)	4(20)	0.269
	Tap water	8	5(62.5)	3(37.5)	
Newly isolate purchased animals	Yes	5	2(36)	3(64)	0.014
	No	25	21(84)	4(16)	
Abortion	Yes	9	7(77.77)	2(22.22)	0.925
	No	21	16(76.19)	5(23.80)	

Total of total 150 buffaloes were screened, among these 11 were positive and 139 were recorded negative for BVD virus. Highest prevalence (13.33%) was found at district Dera Ismail Khan followed by Kohat (10%), Bannu and Peshawar (6.66%). No Buffaloes was found positive at district Mardan (Fig. 2). Total of 38 positive animals were recorded, among these 8

animals both cattle and buffaloes have earlier history of abortion. More relationship between BVD virus sero-positivity and previous history of abortion was found in Fresian X Local (66.66%).

While in case of buffaloes out of total 11 BVD virus positive animals 6 buffaloes (54.54%) were with

previous history of abortion. Similarly the prevalence of (40%) was found in Sahiwal breed followed by Nili Ravi (7.33%), Fresian X sahiwal (10%), and Fresian X

Local (6%) of BVD virus. No prevalence of BVD virus was found for Fresian breed (Fig. 3).

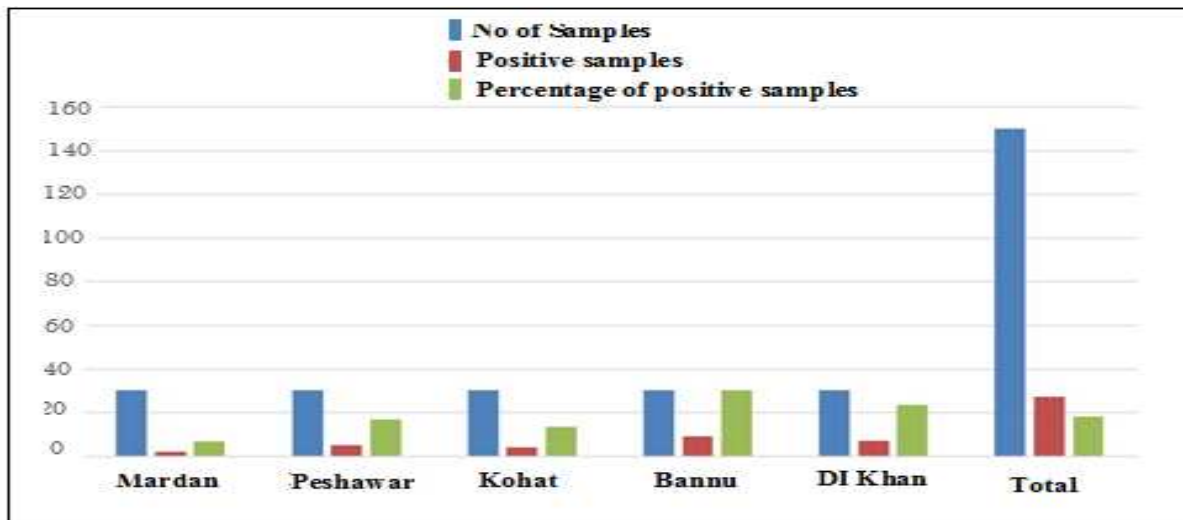


Fig. 1. District wise sero-prevalence of BVD virus in cattle.

*Risk factors analysis*

To obtained evidence regarding identification of associated risk factors BVD virus, a structured questionnaire including close-ended interrogations was planned. Total of 30 dairy farms, only 26 farms were found to have veterinary services while four

farms were found to have no veterinary services. Among 30 owners only 08 farms owners were aware of biosecurity and remaining 22 were not aware and workers were not restricted to visit other farms. The 23 farms showed sero-positivity and remaining 7 were seronegative against BVD virus.

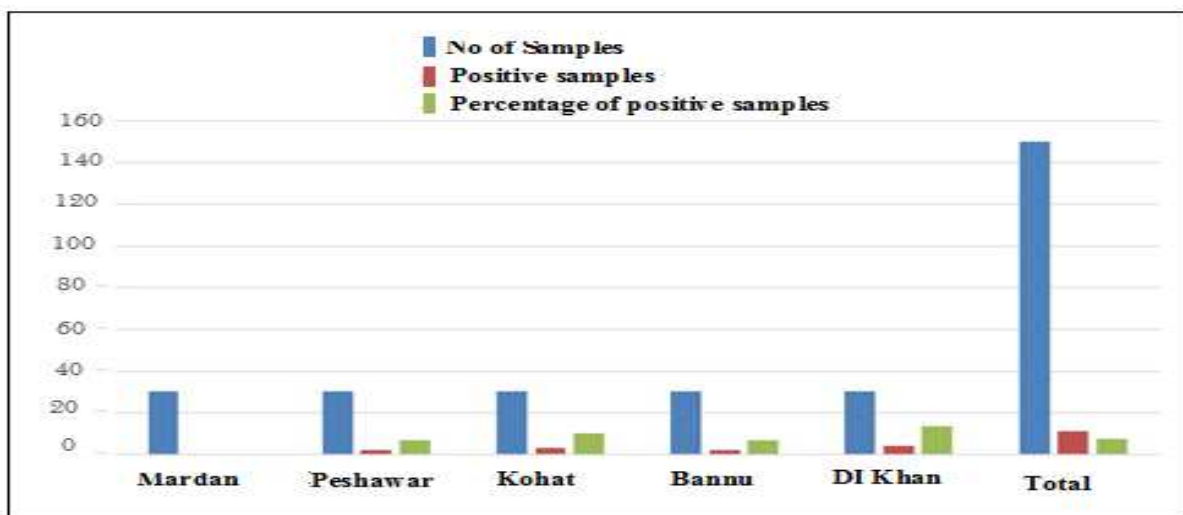


Fig. 2. District wise prevalence of BVD virus in Buffalos.

The farms having 10-25, 26-50, and >50 animals were named as small, medium and large dairy farms respectively. High sero-prevalence of BVD virus was observed in large sized herds (83.33%) followed by medium (81.81%) and small sized herds (69.23%).

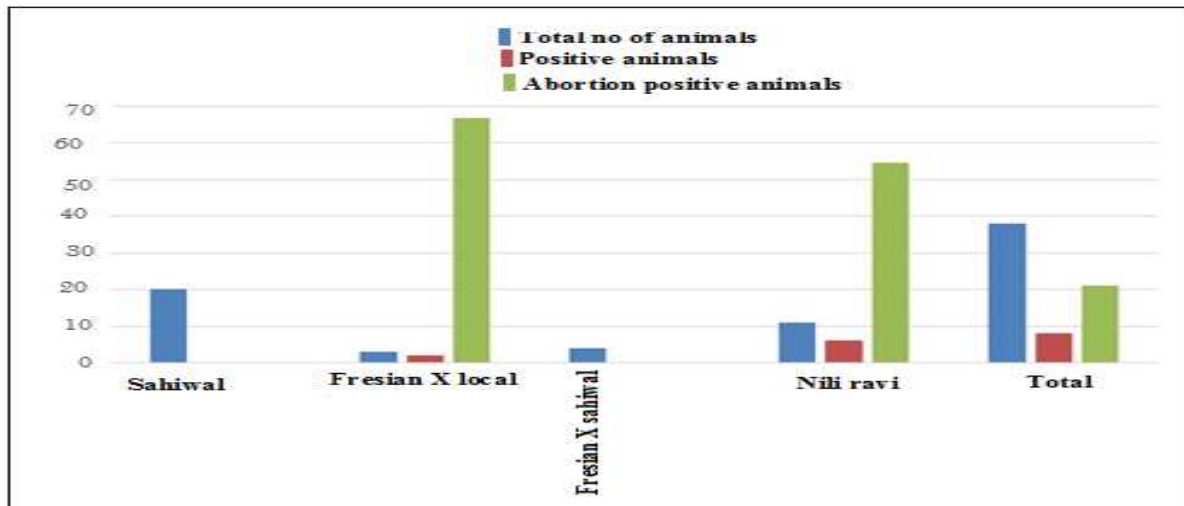
Out of 30 farms, 22 farms were found to use well water while in 8 tapes water was used. In 22 farms where well water was used 18(80%) were seropositive and 4(20%) wereseronegative against BVD virus (Table 2).

### Discussion

Bovine Viral Diarrhea (BVD) is dignified one of the most common and economically most significant viral contagions in cattle in several countries of the world. In the present study, total of 300 blood samples were screened, among these 38 blood samples were for both cattle and buffaloes population. Sero-prevalence was found higher in cattle (18%) as compared to

buffaloes (7.33%). As a whole 12.66% sero-prevalence of BVD virus was detected in the tested animals.

The sero-prevalence recorded in this study counterpart with the present reported sero-prevalence of BVD virus in Punjab province, Pakistan in which 11.41% (21 out of 184 tested animals) were BVD virus positive (Uddin *et al.*, 2017).



**Fig. 3.** BVD virus in animals with history of abortion.

The present study sero-prevalence was less than the study performed in Bangladesh where a total sero-prevalence of 51.1% was found (Veldhuis *et al.*, 2017). Similarly our reported sero-prevalence was higher than reported in Netherland where a sero-prevalence of 1.1% respectively (Gaire *et al.*, 2016). This low sero-prevalence might be due to practice of good administration practices, ease of use of quality fodder, putting into practice of routine vaccination and BVD virus control programs by removal of persistently infected animals. Similar study of district wise sero-prevalence was done in 2016 in Nepal where a high 10% was documented in Kavrepalanchowk as compared to Chitwan where low sero-prevalence 3.3% was recorded (Saa *et al.*, 2012). The highest sero prevalence 30% in district Bannu may be due high trend of export and import of animal from Afghanistan. The lowest prevalence in district Mardan may be due to its centralized location having no border for transportation of animals with other countries. District wise sero-prevalence of BVD virus in buffaloes was also done in our study at selected

areas of Khyber Pakhtunkhwa Pakistan. Our study was contrary to the recorded study at Brazil where high and low sero positivity was observed in the absence of veterinary services (Fernandes *et al.*, 2016). While our results was in agreement with the already reported study (Brownlie, 1990) where veterinary services was a probable risk factor. High sero positivity 90% was observed at herds where there was a mixed farming while low sero-prevalence 50% was observed at herds where there was no mixed farming.

### Conclusion

The current study was concluded that dairy animals are positive for antibodies against BVD virus in Khyber Pakhtunkhwa Province, Pakistan. The strategy to control the viral pathogen should be devised and implemented immediately in the field. Distinctive consideration should be given for addressing identified risk factors of this viral infection like to check the status of before allowing entry of newly purchased animals into herds, discouraging the

workers visiting other farms, mixed farming, veterinary services and encouraging culling of animals with more history of abortion.

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