Bangladesh Journal of Veterinary and Animal Sciences
Journal home page: www.bjvas.com
pISSN 2227-6416
eISSN 2709-2542

Short Communication

Prevalence of peste des petits ruminants (PPR) in goats at Keraniganj Upazila of Dhaka district, Bangladesh

Md Solaiman[1], Md Moinul Kabir Bijoy[1], Anas Bin Harun[1], Rayhan Kabir Pranto[1] and Md Robiul Karim[2*]

[1]Faculty of Veterinary Medicine and Animal Science, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur-1706, Bangladesh.
[2]Department of Medicine, Faculty of Veterinary Medicine and Animal Science, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur-1706, Bangladesh.

A R T I C L E I N F O

Article history:
Received: 11/04/2022
Accepted: 11/09/2022

Keywords:
Goat, Keraniganj, Peste des petits ruminants, Prevalence

*Corresponding author:
Cell: +8801717735559
E-mail:
vet_robiul@bsmrau.edu.bd

A B S T R A C T

In this study, we investigated the prevalence of peste des petits ruminants (PPR) in goats registered at Upazila Livestock Office and Veterinary Hospital, Keraniganj, Dhaka. Between 1st June and 10th August, 2021, a total of 255 PPR cases were recorded irrespective of age, sex, and breed. Results indicated that the overall prevalence of PPR in goats was 14.90%. In Black Bengal goats, the prevalence of PPR in different age groups, i.e., up to 6 months, 7-12 months, 13-19 months, and more than 19 months was 18.07%, 20%, 11.11%, and 10%, respectively. Female Black Bengal goats (21.15%) were infected more than males (8.7%). In case of Jamunapari goats, the prevalence of PPR was 11.11%, 13.64%, 37.50%, and 0%, respectively, in the age groups of up to 6 months, 7-12 months, 13-19 months, and more than 19 months. Similarly, female Jamunapari goats (13.95%) had a higher infection rate than males (12.5%). Overall, PPR was found to be more prevalent in Black Bengal goats (15.31%) than in Jamunapari goats (13.56%). Unvaccinated or non-immunized goats had a higher prevalence (19.15%) than vaccinated or immunized goats (2.99%). The findings suggest that age, sex, and breed all have an impact on PPR in goats in the study area.

To cite this paper: *M. Solaiman, M. M. K. Bijoy, A. B. Harun, R. K. Pranto and M. R. Karim, 2022. Prevalence of peste des petits ruminants (PPR) in goats at Keraniganj Upazila of Dhaka district, Bangladesh. Bangladesh Journal of Veterinary and Animal Sciences, 10(1): 65-70.*

1. INTRODUCTION

Peste des petits ruminants (PPR) is a highly contagious viral disease of small ruminants. It is known as the "plague of small ruminants" and is thought to be a risk factor for respiratory disease complex in goats (Taylor et al., 1990). The OIE (The World Organization for Animal Health) has recognized PPR as a notifiable and economically important transboundary viral disease of sheep and goats associated with high morbidity and mortality (Diallo et al., 2007). PPR is caused by the peste des petits ruminants virus (PPRV), which is a member of the family Paramyxoviridae, order Mononegavirales, and genus Morbillivirus (Tober et al., 1998). The PPRV is genetically similar to rinderpest virus (RPV), measles virus (MV), and canine distemper virus (CDV) (Mantip et al., 2019). The transmission of PPR virus occurs through tears, oculo-nasal discharge, small droplets from sneezing or coughing, feces, contaminated waterers or feeding troughs or bedding materials, direct contact with infected animals, and other means (Hasib & Chowdhury, 2020). PPR primarily affects the digestive and respiratory systems, with symptoms including fever, conjunctivitis, diarrhea, bronchopneu-

monia, ulceration and erosion of the oral mucosa, and so on (Balamurugan et al., 2012). PPR was first reported in 1942 in the Ivory Coast in Western Africa and has since extended its range in Asia, the Middle East, and Africa (Baazizi et al., 2017). In Bangladesh, PPR was first detected in goats in 1993 and since then it has become endemic in the country (Islam et al., 2001). The Black Bengal goats were found to be more susceptible (67.24%) to PPR than the Jamunapari breed (32.76%). Morbidity of PPR ranges from 40-95%, with mortality as high as 80-85% (Samad, 2000). It causes significant economic losses in goat production in Bangladesh (Hasib and Chowdhury, 2020).

Epidemiological knowledge is essential for allocating resources efficiently in disease control programs. The clinical prevalence of PPR is important epidemiological data that aids in the effective management of PPR outbreaks. PPR prevalence data are available from a number of Upazilas in Bangladesh where the disease has been reported (Hasib and Chowdhury, 2020). However, no study has been conducted on the epidemiology of PPR in goats at Keraniganj Upazila in Dhaka District. Therefore, the current study was conducted over a two-month period to determine the prevalence of PPR in goats in Keraniganj Upazila.

2. MATERIALS AND METHODS

Study area and duration

This study was conducted at Upazila Livestock Office & Veterinary Hospital, Keraniganj in the district of Dhaka, Bangladesh for a period from June 1st, 2021 to August 10th, 2021.

Study population

A total of 255 goats were included in this study. The goats were selected randomly irrespective of age, breed, and sex over the study period.

Data collection

The animal data were collected from the owners, who brought the goats to the hospital. The clinical data were based on the owner's complaints and anamneses, clinical history, clinical symptoms, and physical examination (inspection, auscultation, temperature, respiration) findings of the goats.

Recording of signs and symptoms

Close inspection: Close inspection was used to carefully record various signs and symptoms such as erosion of oral mucosa, respiratory distress, and discharges from the eyes, nose, and mouth.

Temperature: Temperatures were recorded using a clinical mercury thermometer per rectum and tabulated.

Indirect auscultation: Indirect auscultation was performed with a stethoscope to hear the lung and tracheal sounds and compare them with the symptoms of pneumonia.

Skin turgor test: Skin turgor tests were performed to roughly estimate the degree of dehydration. A fold of skin, along the neck or the back, is given a pinch, pulled upwards, and then released. The skin of a hydrated goat will smooth back down almost immediately, while the skin of a dehydrated animal will slowly smooth down. This is known as the skin turgor test, and a lack of fluids in the goat will affect the elasticity of the skin. The longer the skin stays in position, the poorer the turgor test result, indicating a higher degree of dehydration (*Veterinary Handbook for Cattle, Sheep and Goats > Content*, n.d.).

Diagnosis: The presumptive diagnosis of PPR was made on the basis of the owner's complaints, clinical history, clinical symptoms, and physical examination of all diseased goats brought to the veterinary hospital.

Data analysis

The goats, both Black Bengal and Jamunapari, were divided into four age groups: up to 6 months, 7 to 12 months, 13 to 19 months, and more than 19 months, which were assigned to groups I, II, III, and IV, respectively. The MS Excel program was used to calculate the prevalence of PPR. Chi-square tests and *P*-value were calculated by SSS (online) software. The calculated values were considered to be statistically significant when the *P* value was less than 0.05. Finally, a descriptive analysis of the data was carried out.

3. RESULTS AND DISCUSSION

The purpose of this study was to determine the prevalence of PPR in goats at Keraniganj

Upazila of Dhaka district. Out of the 255 goats examined in this study, 38 goats were clinically infected with PPR. The overall prevalence of PPR was 14.90% (38/255). This is slightly higher than what was found (8.99%) in the goats of Chattogram district (Parvez, 2014), but significantly lower than what was found (50.27%) in the goats of Mirzaganj Upazila of Patuakhali district (Islam et al., 2013) The overall prevalence of PPR in the ruminant population in Punjab, Pakistan was 43.33% (Khan et al., 2007). It was also reported that the overall PPR antibody seroprevalence in goats was 39.02%. In another study, the prevalence of PPR in small ruminants was reported as 40.98% in Pakistan (Abubakar et al., 2008). Meanwhile, PPR antibodies were found in 35% of the goats in Cameroon (N = 320) and 56.5% of the goats in Nigeria (N = 382) (Majiyagbe et al., 1992). So, our findings indicate that PPR was less prevalent in goats in the study area.

Age-wise prevalence of PPR in goats

The prevalence of PPR in Black Bengal goats was higher in group II, with a 20% prevalence. However, in the case of the Jamunapari breed, goats aged between 13 and 19 months were mostly affected, with a prevalence of 37.5%. On the other hand, the prevalence was quite negligible in goats of group IV; it was 10% in Black Bengal goats, and no clinical case was recorded in the case of Jamunapari goats during the study period (Table 1). However, the result was not statistically significant. The findings of this study are consistent with those of Nanda et al. (1996). According to them, PPR was more prevalent in goats under one year old, particularly those aged 4 to 12 months. Taylor et al. (1990) also reported that the susceptibility of young goats aged 3 to 18 months was pretty high. Similarly, Singh et al. (2004) found the highest prevalence of PPR in goats younger than one year.

Sex-wise prevalence of PPR

According to this study, female Black Bengal and Jamunapari goats had a prevalence of 21.15% and 13.95%, respectively, with male goats having a prevalence of 8.7% and 12.5% (Table 2). So, it reveals that the female goats were more susceptible to PPR than the males. The result for Black Bengal goats was statistically significant ($P<0.05$), whereas the result for Jamunapari goats was not. According to Samad (2000), nearly 60.23% of female goats were infected with PPR. However, this study found a lower value than Samad's observation. This might be due to the fact that the sample size and duration of the present study were lower than those of Samad (2000)**.** In general, age, breed, and sex are considered as important risk factors for PPR. The exact cause is unknown, but it is assumed that the females are normally immunologically weaker than males due to hormonal effects, pregnancy, or milking status (Chakrabarti, 2004).

Breed-wise prevalence of PPR

The result of the present study revealed that the Black Bengal breed had a higher prevalence (15.31%) than the Jamunapari breed (13.56%) (Table 3). However, the difference was not statistically significant ($P = 0.9601$).

This result is in agreement with the findings of Kulkarni et al. (1996). Samad (2000) reported that the Black Bengal breed was more susceptible (67.24%) to PPR than the Jamunapari breed (32.76%). The higher incidence of PPR in the indigenous Black Bengal goats could be attributed to increased participation in disease surveillance, immunosuppression, and an irregular vaccination program (Mondal et al., 1995).

Prevalence of PPR based on immune status

The findings of the present study showed that the prevalence of PPR was higher in unvaccinated goats (19.15%) than in vaccinated goats (2.99%), regardless of breed (Table 4). The difference of the prevalence was statistically significant ($P = 0.0044$). This result supports an earlier report that found a higher prevalence of PPR (68.38%) in unvaccinated goats (Gibbs et al., 1979).

4. CONCLUSION

The current study provided important information on the prevalence and risk factors associated with PPR disease in goats. PPR was more common in goats under one year old. Black Bengal goats were more susceptible to PPR than Jamunapari goats. Female goats had a higher infection than the males. PPR was more

prevalent in unvaccinated goats than in vaccinated goats. These risk factors must be considered when implementing necessary preventive measures, such as vaccination and management techniques, at Keraniganj Upazila as well as national levels. Proper vaccination programs can significantly reduce PPR infection in goats. Appropriate surveillance and regular vaccination programs must be implemented to eradicate the deadly disease.

Table 1. Age-wise prevalence of PPR in Black Bengal and Jamunapari goats

Black Bengal goats					
Age group	**No. of goats examined**	**No. of PPR infected goats**	**Prevalence (%)**	**χ^2 test**	**P- value**
Group I	83	15	18.07%	1.6976	0.6375
Group II	30	6	20%		
Group III	63	7	11.11%		
Group IV	20	2	10%		
Jamunapari goats					
Group I	18	2	11.11%	4.0226	0.2590
Group II	22	3	13.64%		
Group III	8	3	37.5%		
Group IV	11	0	-		

Table 2. Sex-wise prevalence of PPR in goats

Black Bengal goats					
Sex	**No. of goats examined**	**No. of PPR infected goats**	**Prevalence (%)**	**χ^2 test**	**P- value**
Female	104	22	21.15%	4.3342	0.0374
Male	92	8	8.7%		
Jamunapari goats					
Female	43	6	13.95%	0.0161	0.8990
Male	16	2	12.5%		

Table 3. Breed-wise prevalence of PPR in goats

Breeds	**No. of goats examined**	**No. of PPR infected goats**	**Prevalence (%)**	**χ^2 test**	**P-value**
Black Bengal	196	30	15.31%	0.0815	0.9601
Jamunapari	59	8	13.56%		
Total	255	38	14.90%		

Table 4. Prevalence of PPR based on immune status of goats

Immune status	**No. of goats examined**	**No. of PPR infected goats**	**Percentage**	**χ^2 test**	**P-value**
Vaccinated	67	2	2.99%	8.1097	0.0044
Unvaccinated	188	36	19.15%		

ACKNOWLEDGEMENT

We acknowledge the officials of the Upazila Livestock Office & Veterinary Hospital at Keraniganj, Dhaka, especially DR. Subrata Sen Biswas, for their assistance in data collection. We would also like to thank DR. S. H. M. Faruk Siddiki, Assistant Professor in the Department of Medicine at BSMRAU, for his help with data analysis.

REFERENCES

Abubakar, M., Jamal, S. M., Hussain, M. and Ali, Q. 2008. Incidence of peste des petits ruminants (PPR) virus in sheep and goat as detected by immuno-capture ELISA (Ic ELISA). Small Ruminant Research, *75*(2–3): 256–259.

Baazizi, R., Mahapatra, M., Clarke, B. D., Ait-Oudhia, K., Khelef, D. and Parida, S. 2017. Peste des petits ruminants (PPR): A neglected tropical disease in Maghreb region of North Africa and its threat to Europe. PLOS ONE, 12(4): e0175461.

Balamurugan, V., Saravanan, P., Sen, A., Rajak, K. K., Venkatesan, G., Krishnamoorthy, P., Bhanuprakash, V. and Singh, R. K. 2012. Prevalence of peste des petits ruminants among sheep and goats in India. Journal of Veterinary Science, 13(3): 279–285.

Chakrabarti, A. 2004. *Textbook of Preventive Veterinary Medicine* (5th ed.).

Diallo, A., Minet, C., le Goff, C., Berhe, G., Albina, E., Libeau, G. and Barrett, T. 2007. The threat of peste des petits ruminants: progress in vaccine development for disease control. *Vaccine*, *25*(30): 5591–5597.

Gibbs, D. P. J., Taylormichael, W. P., Lawman, J. P. and Bryant, J. 1979. Classification of peste des petits ruminants virus as the fourth member of the genus Morbillivirus. Intervirology, *11*(5), 268–274.

Hasib, F. M. Y. and Chowdhury, S. 2020. Review and Meta-Analysis of PPR in Goat and Sheep of Bangladesh from 2000 to 2019. Turkish Journal of Agriculture - Food Science and Technology, 8(10): 2099–2104.

Islam, M., Khan, M., Kader, H., Begum, M. and Asgar, M. 2013. Prevalence of PPR of Goat and Their Response to Antibiotic Treatment at Mirzaganj Upazila of Patuakhali Distrtict. Journal of Environmental Science and Natural Resources, 5(2): 181–184.

Islam, M., Shamsuddin, M., Rahman M.A, das PM and Dewan M.L. 2001. An outbreak of peste des petits ruminants in Black Bengal goats in Mymensingh, Bangladesh. The Bangladesh Veterinarian, 18(1): 14–19.

Khan, H. A., Siddique, M., Arshad, M. J., Khan, Q. M. and Rehman, S. U. 2007. Sero-prevalence of peste des petits ruminants (PPR) virus in sheep and goats in Punjab Province of Pakistan. Pakistan Veterinary Journal, 27(3): 109–112.

Kulkarni, D. D., Bhikane, A. U., Shaila, M. S., Varalakshmi, P., Apte, M. P. and Narladkar, B. W. 1996. Peste des petits ruminants in goats in India. Veterinary Record, 138(8): 187–188.

Majiyagbe, K. A., Shamaki, D. and Udeani, T. K. C. 1992. Observation on outbreaks of peste des petits ruminants in organized goat farms and approach of its treatment and preservation. Small Ruminant Research and Development in Africa. Second Biennial Conference of the African Small Ruminant Research Network AICC.

Mantip, S. E., Shamaki, D. and Farougou, S. 2019. Peste des petits ruminants in Africa: Meta-analysis of the virus isolation in molecular epidemiology studies. The Onderstepoort Journal of Veterinary Research, 86(1): e1-e15

Mondal, A. K., Chottopadhyay, A., Sarkar, S. D., Saha, G. R. and Bhowmik, M. K. 1995. Report on epizootiological and clinicopathological observations on peste des petits ruminants (PPR) of goats in West Bengal. Indian Journal of Animal Health, 34: 145–148.

Nanda, Y. P., Chatterjee, A., Purohit, A. K., Diallo, A., Innui, K., Sharma, R. N., Libeau, G., Thevasagayam, J. A., Brüning, A., Kitching, R. P., Anderson, J., Barrett, T. and Taylor, W. P. 1996. The isolation of peste des petits ruminants virus from Northern India. Veterinary Microbiology, 51(3–4): 207–216.

Parvez, M. A. 2014. Prevalence and associated risk factors of Peste des Petits Ruminants (PPR) in goats in Chittagong district, Bangladesh. Research Journal for Veterinary Practitioners, 2(1s), 14–17.

Samad M. A. 2000. PoshuPalon O Chikitsavidya (Animal Husbandry and Medicine) (2nd ed.).

Singh, R. P., Sreenivasa, B. P., Dhar, P. and Bandyopadhyay, S. K. 2004. A sandwich-ELISA for the diagnosis of Peste des petits ruminants (PPR) infection in small ruminants using anti-nucleocapsid protein monoclonal antibody. Archives of Virology, 149(11): 2155–2170.

Taylor, W. P., al Busaidy, S. and Barrett, T. 1990. The epidemiology of peste des petits ruminants in the Sultanate of Oman. Veterinary Microbiology, 22(4), 341–352.

Tober, C., Seufert, M., Schneider, H., Billeter, M. A., Johnston, I. C. D., Niewiesk, S., ter Meulen, V. and Schneider-Schaulies, S. 1998. Expression of measles virus V protein is associated with pathogenicity and control of viral RNA synthesis. Journal of Virology, 72(10): 8124–8132.

Veterinary handbook for cattle, sheep and goats > *Content*. (n.d.). Retrieved May 27, 2022, from http://www.veterinaryhandbook.com.au/ContentSection.aspx?id=33