

Prevalence and clinico-pathological parameters of PPR infected goats and their response to antibiotic treatment at Panchlaish, Chittagong, Bangladesh.

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ABSTRACT

The present study was conducted in the Panchlaish Upazilla Veterinary Hospital of Chittagong district during the period of July to September, 2013 to find out the prevalence and clinico-pathological findings of Peste des petits ruminants (PPR) in goats, and to observe the response of PPR-goats to different treatments. During the course of study 202 goats were examined of which 98 were PPR positive. Diagnosis of a PPR case was made following the clinical examinations. The results shows that the median age of PPR-goats was higher compared with the healthy ones. The median per-rectum temperature, heart and respiratory rates were also higher in the the PPR-positive goats. No significant difference was seen on its prevalence in goats belonging to Black Bengal or Jamunapari breeds. Its occurrence was also evenly seen in each of the three months- July, August and September. But, prevalence of PPR was significantly higher in the non-vaccinated goats. Some hematological parameters except neutrophil count was lower in PPR goats. The recovery rate from clinical signs was higher in goats treated with parenteral administration of oxytetracycline.

Key words: antibiotic, blood analysis, goats, PPR, Clinical parameters

INTRODUCTION

Peste des petits ruminants (PPR) is an acute or sub-acute, contagious viral disease of small ruminants emphasized for goats of Bangladesh [1]. Both sheep and goats become affected although goats are often more severely affected than sheep [2]. The risk of PPR is 62.5 % in domestic small ruminants around the globe [3]. Transmission occurs by close contact, inhalation of aerosol produced by direct and indirect approach [4]. The disease is characterized by high fever, necrotic stomatitis, catarrhal inflammation of the ocular and nasal mucosae, dyspnea, diarrhea and death [1]. In epidemic areas, morbidity rate has been estimated between 80-90% and mortality between 50-80% [5]. Necropsy of diseased goats revealed congested and consolidated pneumonic lungs, generalized enlargement of lymphnodes accompanied with necrosis and congestion of some lymphnodes, atrophied congested spleen and hemorrhagic gastroenteritis [6]. Excluding clinical signs, history and complete blood count the PPR can also be diagnosed by using Hemagglutination test (HA), Complement fixation test (CFT), Immuno-electro-osmo-precipitation test and Enzyme linked immuno-sorbent assay (ELISA) [7]. Determination of hematology of animals helps veterinarians to confirm clinical diagnosis, estimate the severity of cases, administer appropriate treatment, and evaluate outcomes [8].

The disease was shown to be more severe among young animals, and, therefore, causes high economic losses in these animals [9]. On the other hand, its morbidity and mortality rates rise with presence of

secondary infections such as pox, ecthyma, *E. coli*, pasteurellosis, coccidiosis and cryptosporidiosis infections [10]. There is no specific treatment and control is possible only with vaccination. Therefore, the present study was carried out to find the overall prevalence of PPR in relation with breed, age, sex, season and immune status of goats and to determine hematological parameters and therapeutic outcomes in goats of a coastal area of Bangladesh.

MATERIALS AND METHODS

Study area and duration

The study was carried out for three months period from July to September, 2013 in the Upazilla Veterinary Hospital, Panchlaish, Chittagong, Bangladesh.

Population and tools used for data collection

The study was conducted on natural PPR infected goats of various age, sex and breed that were brought to the hospital over the study period. A total of 202 goats were registered for treatments of which 98 were diagnosed with PPR. Close inspection was performed properly in order to observe the presenting signs.

Medication:

For observing the treatment efficacy the PPR goats were divided into three groups:

Group I: treated with Dadin[®] (Sulphadimidine-Na) (Renata Ltd., Bangladesh) + Antihista vet[®] (Pheneramine melete) (Square Pharma, Bangladesh) + Renalyte[®] (ORS) (Renata Ltd., Bangladesh).

Group II: treated with Renamycin-100[®] (Oxytetracycline) (Renata Ltd., Bangladesh) + Antihista vet[®] (Pheneramine meleate) + Renalyte[®] (ORS) and

Group III: treated with oral or gut acting sulphonamide (Cotrim vet[®]) (Square Pharma, Bangladesh) + Renalyte[®] (ORS).

A response to a treatment was measured by recovery from the clinical illness.

Hematological analysis:

Hematological analysis of a sample was performed on an autohemolyzer within 24 hours of collection of a blood sample in the Department of Physiology, Biochemistry and Pharmacology at CVASU according to the biochemical analyzer manual (Humalyzer 3000, Germany^R). In total blood was collected from 20 PPR-goats whose hematological parameters were compared with the values of those from 20 healthy goats.

Statistical analysis

All data were collated and stored into a spreadsheet (Microsoft office excel-2007, USA). The Excel spread sheet was imported to SAS version 9.2 for further analysis. Categorical variables; sex, breed, vaccination status, season were tested with Chi square test to estimate the effect of the variables on the outcome (PPR) and continuous variables; age, temperature, heart rate, respiratory rate were tested with t-test where the null hypothesis was that there was no difference in mean between positive and negative groups of animals. Descriptive analysis was done by means of histogram and boxplot. An

association was regarded as significant if the p-value was <0.05.

RESULTS

Demographic statistics of PPR-positive goats

A total of 202 goats belonging to different breeds were brought to the hospital by their owners/attendants, of which 98 were found PPR-positive, by thorough clinical examinations and in few cases with post mortem investigations. The median age of PPR-goats was higher compared with the healthy ones (Figure 1). Like age, the median per-rectum temperature (°F) was also higher in the PPR-goats (Figure 2); heart rate and respiratory rate were also higher in the PPR-goats compared with the healthy ones (Table 2).

The occurrences PPR in goats associated with the categorical variables: breed of goats, sex, status of PPR-vaccination and month of occurrence are in Table 1. PPR was evenly distributed in Black Bengal and Jamunapai goats ($p>0.05$) and in male and female goats. It could be evenly seen in any of the three months observed – July, August and September. However its occurrence was significantly higher in the non-vaccinated compared with the vaccinated ones ($p<0.001$) (Table 1).

PPR associated with different continuous variables assessed

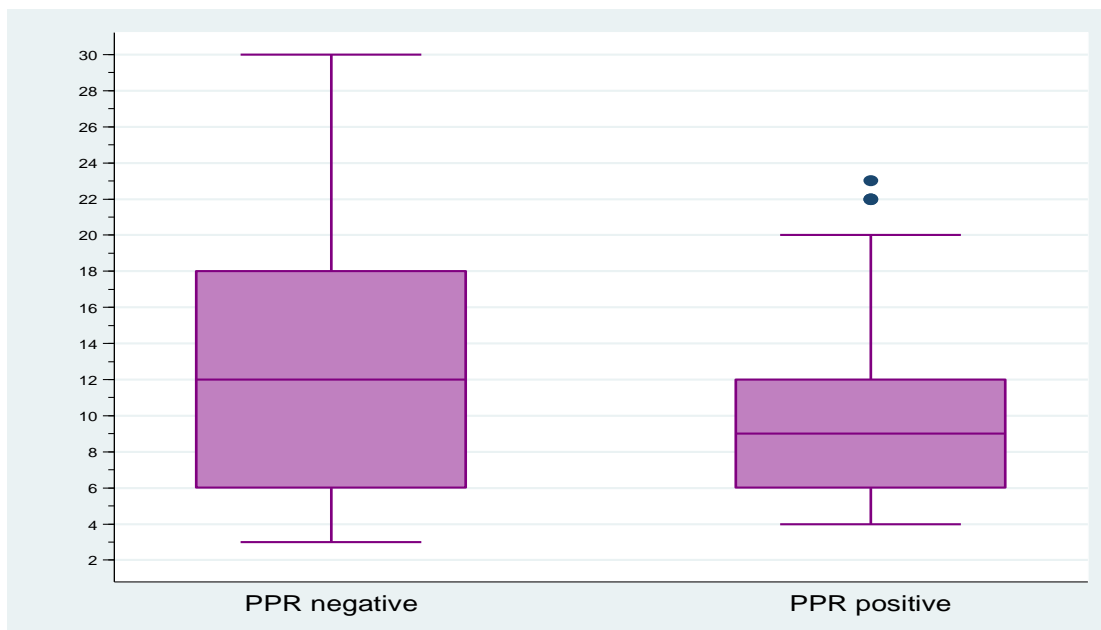


Figure 1: shows that- Among PPR negative animals, minimum age was 3 months and maximum age was 30 months. 25% animal were equal or below 6 months of age and 75% animals were equal or below 18 months of age. The median age for this group of animals was 12 months. Similarly, among PPR positive animals, minimum and maximum ages were 6 months and 20 months, respectively. 25% animals were equal or below 6 months and 75% animals were equal or below 12 months of age. The median age for this group of animals was 9 months.

Table 2 is presented with the occurrences PPR in goats associated with the variables: age (in month),

temperature, heart rate and respiratory rate. The mean value of temperature in PPR-goats was

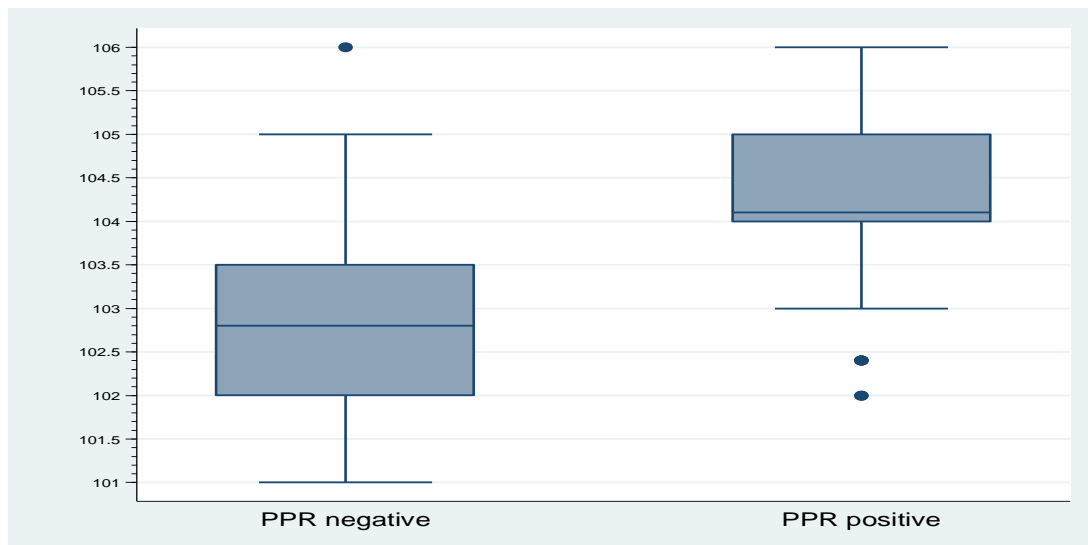


Figure 2: shows that- Among PPR negative animals, minimum temperature was 101°F and maximum temperature was 105°F. 25% animal were equal or below 102°F of temperature and 75% animals were equal or below 103.5°F of temperature. The median temperature for this group of animals was 102.8°F. Similarly, among PPR positive animals, minimum and maximum temperatures were 103°F and 106°F, respectively. 25% animals were equal or below 104°F and 75% animals were equal or below 105°F of temperature. The median temperature for this group of animals was 104.1°F.

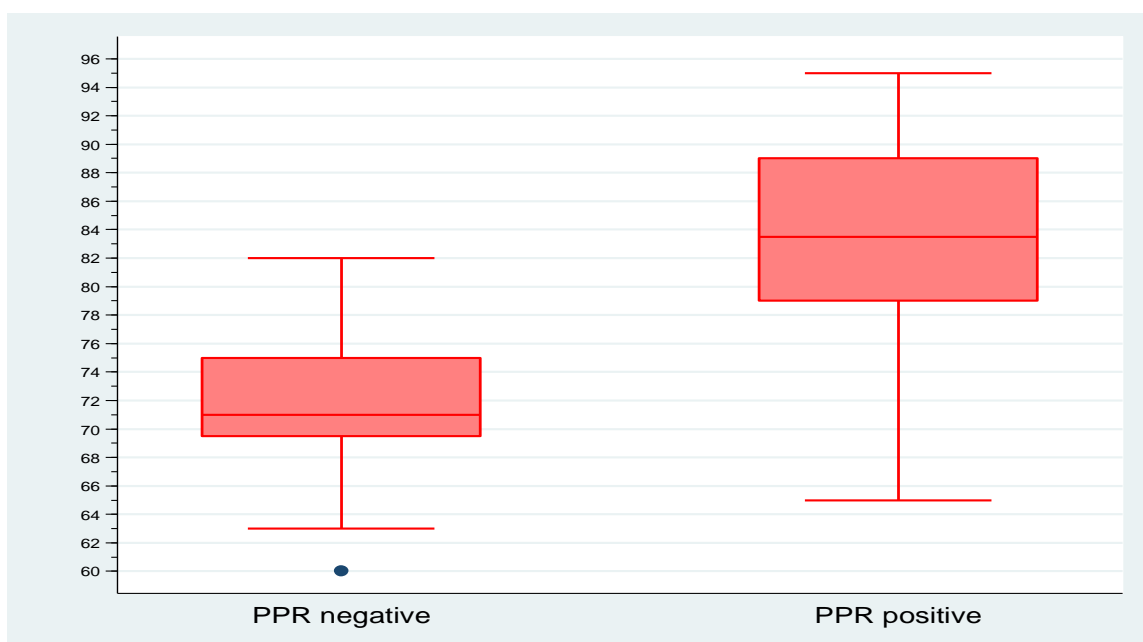


Figure 3: shows that- Among PPR negative animals, minimum heart rate was 63 and maximum heart rate was 82. 25% animal were equal or below 69 of heart rate and 75% animals were equal or below 75 of heart rate. The median heart rate for this group of animals was 71. Similarly, among PPR positive animals, minimum and maximum heart rates were 65 and 95, respectively. 25% animals were equal or below 79 and 75% animals were equal or below 89 of heart rate. The median heart rate for this group of animals was 83.

104.8°F, significantly higher to those that were PPR-negative ($p < 0.001$). The mean heart rate and respiratory rates in the PPR-goats were 83 and ~36 per minute, significantly higher to the PPR-negative goats ($p < 0.001$).

Comparison of hematological pictures

Table 3 shows the hematological pictures of 20 PPR affected goats compared with 20 normal goats. In diseased animal the mean values of some key hematological parameters - Hb (8.20 gm%), PCV (18.90), TEC (9.50 million/mm³), TLC (9.80 thousand/mm³), ESR (0 hour), lymphocyte (41.20%), monocyte (3.80%), eosinophil (3.90%), basophil (0.90%) were proportionately but not significantly lower, and the differential count of neutrophils in PPR-positive goats were higher compared with the healthy animals (Figure 5).

Response of PPR cases to different treatments

The response of PPR-goats, in three groups showed that, 58% PPR-positive goats survived when they were treated with parenteral administration of oxytetracycline. The response to the use of parenteral or gut active sulfonamides was about 28 and 23%, respectively, significantly lower to the rate achieved by the use of oxytetracycline (Table 4).

DISCUSSION

Breedwise prevalence of PPR was 52% in Black Bengal, 49% in Jamuna Pari and 43% in Cross breed

goats. Apparently the disease does not differ significantly ($P > 0.05$) in association with breeds but in Black Bengal goats the percentage (%) of the occurrence of disease was comparatively higher. This findings are in line with previous finding that the prevalence of PPR was higher in indigenous Black Bengal (27.13%) goats than Jamunapari (11.81%) and exotic breeds (9.68%) [11]. This result is also similar with finding of previous reports [12]; it is also reported that Black Bengal goats are more susceptible to PPR than Jamunapari (31.78%) [1].

The disease was almost evenly distributed in both male and female goats, is supported by previous report [13]. But the sex of goats had no effect on the development of PPRV antibodies [14].

According to vaccination status, 66% prevalence was recorded in non-vaccinated goats and 26% prevalence in vaccinated goats. This result supports the early report where the prevalence of PPR is higher (66.40%) in non-vaccinated as compare with vaccinated (19.56%) animals [1]. A higher prevalence of PPR in the non vaccinated goat population was also found earlier [15]. In the present study, the disease differed significantly ($P < 0.05$) between vaccinated and non vaccinated goats, suggesting that non vaccinated animals are at a higher risk to PPR. Vaccination against PPR leads to decrease in the disease prevalence but cannot protect absolutely [16]. This efficacy of PPR vaccine in reducing the prevalence of PPR was also reported [17].

The disease was a bit higher during the month of

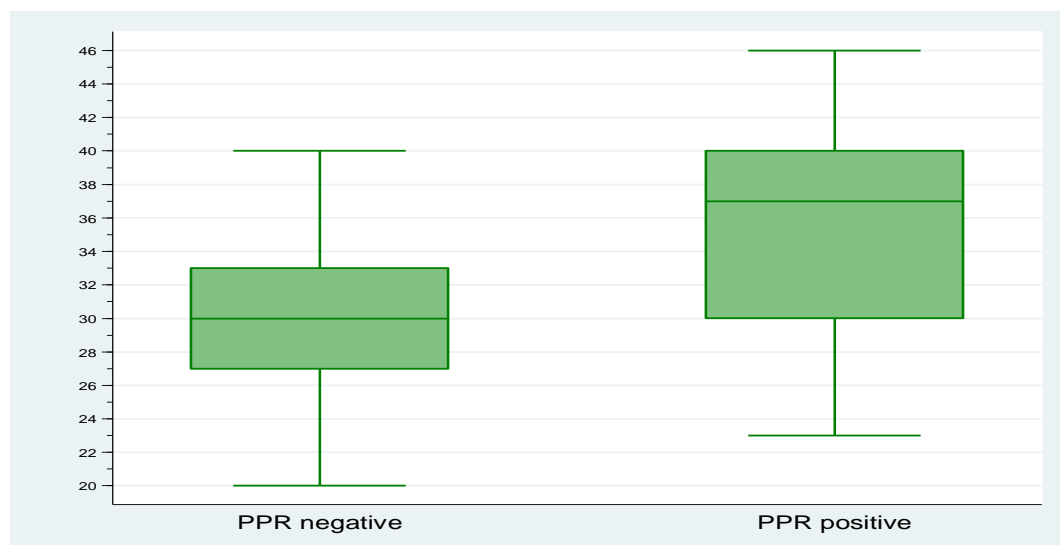


Figure 4 shows that- Among PPR negative animals, minimum respiratory rate was 20 and maximum respiratory rate was 40. 25% animal were equal or below 27 of respiratory rate and 75% animals were equal or below 33 of respiratory rate. The median respiratory rate for this group of animals was 30. Similarly, among PPR positive animals, minimum and maximum respiratory rate were 23 and 46, respectively. 25% animals were equal or below 30 and 75% animals were equal or below 40 of respiratory rate. The median respiratory rate for this group of animals was 37.

August (54%), July (47%) and lowest in September (42%). Apparently, the disease does not differ significantly ($P>0.05$) between the months, but a comparative higher occurrence of PPR was observed

[18].The increased susceptibility of young goats were might be due to malnutrition, poor immunity and poor management systems [11]. The median temperature recorded in this

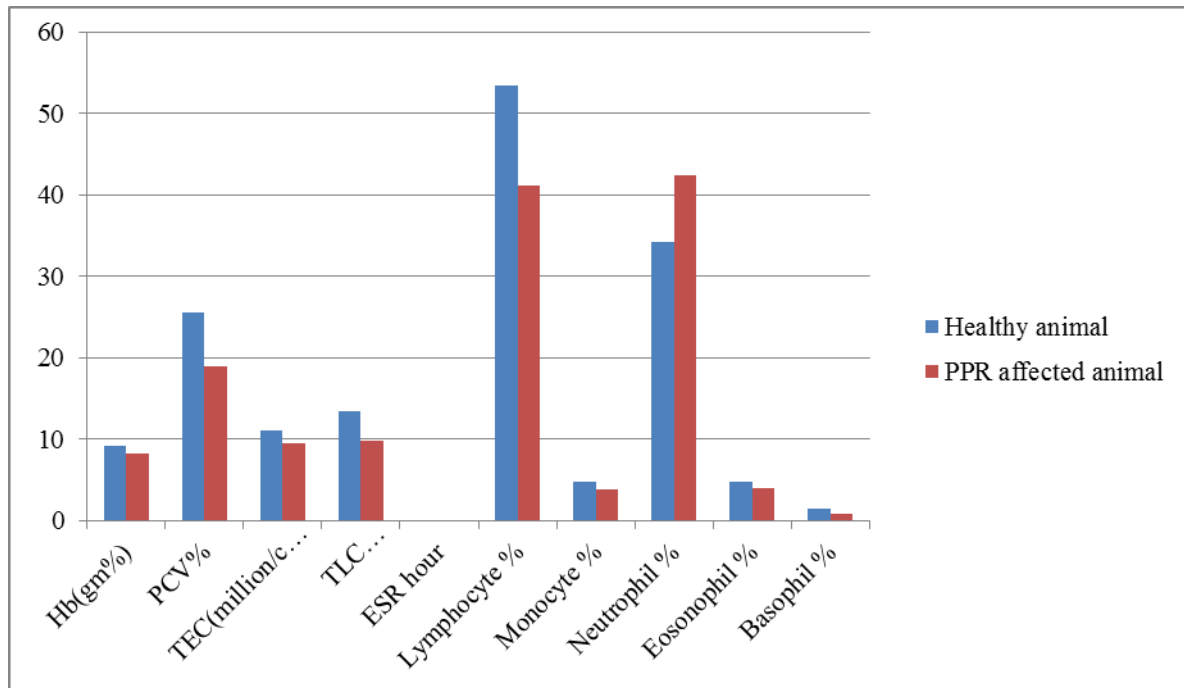


Figure 5: Hematological pictures of PPR-positive and negative goats observed in the study

in the Rainy season [12].

It was reported previously that the age group - between 4 to 12 months was more prone to PPR than older (>1 year) also assessed that the disease was most prevalent in the goats less than one year of age

investigation was 104.83°F. Similar higher temperature was described previously [6]. This study also shows a higher heart rate and respiratory rate in PPR positive goats than negative goats ($P<0.05$). Higher heart rate may be the results of age of the

Table 1: The frequencies of occurrences of PPR associated with different categorical variables assessed in the study

Variables	Level	Number of observation	PPR positive N (%)	Chi square value	P value
Breed	Black Bengal	87	45 (52)	1.02	0.59
	Cross	47	20 (43)		
	Jamuna Pari	68	33(49)		
Sex	Female	66	36 (55)	1.42	0.23
	Male	136	62 (46)		
Vaccination	No	114	75 (66)	31.26	<0.001
	Yes	88	23 (26)		
Month of the year	July	83	41 (49)	0.28	0.86
	August	64	32 (50)		
	September	55	25 (45)		

Table 2: Comparison of mean values of different continuous variables in PPR- positive and PPR- negative goats

Variables	Disease status of the goat	Mean	SE	95% CI	p-value
Age (month)	PPR negative	13.0	0.71	11.59-14.42	0.002
	PPR positive	9.84	0.45	8.95-10.74	
Temperature	PPR negative	102.67	0.10	102.62-103.02	<0.001
	PPR positive	104.83	0.08	104.03-104.98	
Heart rate	PPR negative	72.03	0.41	71.22-72.88	<0.001
	PPR positive	83.00	0.72	81.54-84.45	
Respiratory rate	PPR negative	30.4	0.46	29.48-31.34	<0.001
	PPR positive	35.54	0.57	34.41-36.71	

animal, severity of dehydration and nutritional status as supported by previous report of PPR-goats [19]. On the other hand respiratory rate mainly increases in PPR-goats that suffer from chronic pneumonic condition [19].

The values of all hematological parameters decreased in the PPR-affected goats compared to healthy goats except neutrophil counts. Total erythrocyte counts (million/mm³) and Hb (gm %) were similar in both the PPR-infected and healthy goats, and PCV (%) decreased. The Hb% and PCV (%) reflect the downturn of the TEC counts. ESR count was 0 mm in 1st hour in both cases. Total leukocyte counts were higher in healthy goat as compared to affected goats, though this value did not cross the normal limit. The counts for neutrophils were significantly higher in the PPRV-infected group. In contrast, lymphocyte counts in the PPRV-infected goats were lower than healthy goats (P<0.05). Monocyte, Eosinophil and Basophil counts were lower in PPRV-infected goats than in healthy goats [10].

The percentage response of treatment towards parenteral (I/M) use of oxytetracycline was higher (58%) than the use of parenteral (I/M) and/or oral/gut acting sulphonamide (23%). This is similar to the previous findings, who reported that the percentage of response to treatment from parenteral (I/M) oxytetracycline use was high (33.87%) than parenteral (I/M) sulphonamide (31.58%) and oral/gut active sulphonamide (16.00%) [12].

CONCLUSION

The median age of PPR-goats might be higher compared with the healthy ones in the coastal areas in Bangladesh. Clinically, the median per-rectum temperature is higher in the PPR-positive goats similar to heart and respiratory rates. PPR is evenly distributed in both Black Bengal and Jamunapari goats, and in male and female goats. Its occurrence can evenly be seen in each of the three months-July, August and September. However, PPR occurrence is significantly higher in the non-vaccinated goats. Some hematological parameters might be lower in PPR-goats compared with the healthy ones, but neutrophil count might be higher in PPR-positive goats. Finally, Oxytetracycline might be used to treat the secondary bacterial infection in PPR goat to save the life with cost effective approach.

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Table 3: Comparison of Hematological pictures (Mean) of healthy and PPRV affected goat

SL NO	Parameters	Healthy goat		PPR affected goat	
		Mean	Min-Max	Mean	Min-Max
1	Hb (gm %)	9.10	6.50-12.50	8.20	6.80-12.00
2	PCV (%)	25.60	16-32	18.90	14.00-29.00
3	TEC (million/mm ³)	11.10	7.56-14.70	9.50	6.66-13.50
4	TLC (thousand/mm ³)	13.45	8.90-16.20	9.80	7.00-12.30
5	ESR (hour)	0	0-0	0	0
6	DLC (%)	-	-	-	-
a	Lymphocyte (%)	53.40	37-70	41.20	32-55
b	Monocyte (%)	4.80	1-7	3.80	1-6
c	Neutrophil (%)	34.20	25-42	42.40	33-56
d	Eosinophil (%)	4.80	3-7	3.90	2-6
e	Basophil (%)	1.40	0-3	0.90	0-2

Table 4: Response of PPR-goats to different treatments (in three groups)

Group	Drugs used	Response to treatment		Total	% of response to treatment
		Positive	Negative		
I	Diadin® (Sulphadimidine-Na) + Antihista vet® (Pheneraminemeleate) + Renalyte® (ORS)	13	33	46	28
II	Renamycin-100® (Oxytetracycline) + Antihista vet® (Pheneraminemeleate) + Renalyte® (ORS)	15	11	26	58
II	Oral or gut acting sulphonamide (Cotrim vet®) + Renalyte® (ORS)	6	20	26	23

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