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Immune response against *Peste des petits ruminants* (PPR) Vaccine

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Abstract

Peste des petits ruminants (PPR), an acute viral disease that primarily affects goats and sheep, has been discovered in Sub-Saharan Africa, Arabia, the Middle East, and Southern Asia. Several outbreaks of this disease have been reported in various Indian states. Due to high mortality in both young and adult ruminants, the disease is causing a high economic disaster in small ruminants. Support for diagnostic techniques and timely vaccination of the vulnerable population are required for effective PPR control and elimination. The current study looked at the immune responses of 30 goats after they were immunized with the Sungri 96 strain of PPR vaccine. From 15 to 90 days after vaccination, the immune response to the PPR vaccine was assessed using competitive ELISA (c-ELISA). In goats, the pre-vaccination mean percentage inhibition (PI) value was 10.14. The mean percentage inhibition (PI) values on the 15th, 30th, 45th, 60th, 75th, and 90th days after vaccination were 44.54, 61.52, 72.80, 71.07, 67.35, and 66.05. Antibody titers remained above the level of protection in all animals 30 to 90 days after vaccination. An age-based study of goat immune responses to PPR vaccine revealed no significant ($p < 0.05$) differences between age groups.

Keywords: Immune response, *Peste des petits ruminants* (PPR), PPR vaccine

Introduction

Peste des petits ruminants (PPR) was first described in 1940 in West Africa (Gargadennec and Lalanne 1942) [2]. It has since been reported in Sub-Saharan Africa, the Arabian Peninsula, and the Middle East (Lefevre *et al.*, 1991) [4]. The disease was first discovered in India in the village of Arasur in the district of Villupuram in Tamil Nadu (Shaila *et al.*, 1989) [6]. This disease is now thought to be endemic throughout India (Singh *et al.*, 2002) [7]. Many researchers have emphasized the potential advantages of PPR vaccination. PPR Sungri 96 strain, an Indian homologous PPR vaccine, was discovered to be potent, efficacious, and safe for commercial production and use. Utilization of this vaccine to protect small ruminants can be helpful to pave the way for PPR control program. (Saravan *et al.*, 2010) [5]. As this vaccine is being introduced for replacement of TCRV, it is necessary to study immune response against PPR vaccination so as to propose an efficient vaccination programme.

Materials and Methods

This research was carried out at Livestock instructional Farm of KNP College of Vet. Science Shirval. Total 30 goats were chosen at random for this experiment. The uniform managerial practices were followed during the entire period of this experiment. The animals were dewormed before being vaccinated. A total of 10 ml of blood was drawn from each animal. The blood samples were allowed to coagulate in slants for two hours at room temperature before being refrigerated overnight for serum separation. Sera were separated into vials and stored at -20°C until analysis. Pre-vaccination blood was collected from each goat on (day 0). Animals were vaccinated using the Sungri 96 PPR virus strain vaccine. The immune response of vaccinated animals was monitored up to 90 days. First post vaccination blood was collected on 15th day from jugular vein aseptically in sterilized test tubes. Subsequent blood collections were made similarly on 30th, 45th, 60th, 75th and 90th days post vaccination. All the sera samples were subjected to competitive ELISA (c-ELISA).

Results and Discussion

All goats and sheep selected for present study were screened for presence of antibodies against PPR by c- ELISA test. Those animals were found negative for the presence of antibodies against PPR (PI<40) before vaccination were used in this work. In the present study, immune response of 30 goats was assessed up to 90 days post vaccination. The test serum samples showing more than 40 per cent inhibition of mean OD values of monoclonal antibody control (Cm) wells were considered as positive for PPRV antibodies. Mean percentage inhibition (PI) values on 15th, 30th, 45th, 60th, 75th, and 90th days post vaccination were recorded as 44.54±2.13, 61.52±1.87, 72.80±1.17, 71.07±1.06, 67.35±1.65 and 66.05±1.67 in goats. On 15th and 30th days post vaccination, 18 (60.00%) and 28 (93.33%) goats found positive for PPR antibodies. All the goats (100%) were positive for PPR antibodies on 45th days of post vaccination. Highest mean percentage inhibition (PI) values 72.80% were recorded on 45th day. Significant decrease in mean PI values was noticed from 75th day (mean PI 67.35) till 90th day (mean PI 66.05). Antibody titers remained well above the protection level after 30 to 90 days post vaccination. This findings is in agreement with the observations of Awa *et al.*, (2002) [1] who reported

the protective titers against PPR in sheep and goats for 12 months using the serum neutralization test. The effect of age on post vaccination immune response was also analyzed during this study within the different age groups of goats available. Goats were divided into different age groups a) 0 -1 year (n=3), b) 1-2 years (n = 7), c) 2-3 years (n =11), d) 3-4 years (n = 5), e) 4-5 years (n = 4). The test was conducted on 180 sera samples collected during the period of 15 to 90 days post vaccination. Mean percentage inhibition (PI) values in 0 - 1 year age group on 15th, 30th, 45th, 60th, 75th, and 90th days post vaccination were recorded as 36.57, 60.59, 73.67, 74.00, 68.97, 67.63. In 1 - 2 years age group, mean PI values were 45.07, 66.60, 76.02, 72.76, 71.11 and 69.53. In 2 -3 years age group, mean PI values were 48.58, 60.66, 71.26, 70.61, 65.31 and 63.96. In 3 -4 years age group, mean PI values were 46.89, 62.10, 70.87, 70.54, 69.72 and 68.90. In 4-5 years age group, mean PI values were 35.55, 54.92, 73.13, 67.83, 62.23 and 60.96 respectively. Statistical analysis of data indicated non-significant ($p<0.05$) difference between the immune response within different age groups of goats. These results are in agreement with the study conducted by Hilan *et al.*, (2006) [3] who reported that there was no influence of age and gender on immune response in goats and sheep.

Table 1: Post – vaccination immune response of goats against PPR vaccine

Species	Mean percentage inhibition (PI)±SE						
	0 day PI	15 th day PI	30 th day PI	45 th day PI	60 th day PI	75 th day PI	90 th day PI
Goat	10.04±1.17	44.54±2.13	61.52±1.87	72.80±1.17	71.07±1.06	67.35±1.65	66.05±1.67

Table 2: Percent of seropositive goats after *Peste des petits ruminants* (PPR) vaccination

Vaccination Status	Days	Goat			
		Number tested	Number positive	% Positive	Mean PI±S.E
Pre-vaccination	0	30	0	0	10.04±1.17
Post-vaccination	15	30	18	60.00	44.54±2.13
	30	30	28	93.33	61.52±1.87
	45	30	30	100	72.80±1.17
	60	30	30	100	71.07±1.06
	75	30	30	100	67.35±1.65
	90	30	30	100	66.05±1.67

Table 3: Age wise immune response in goats against PPR vaccine

Sr. No	Age(Months)	Number of animals	Mean percentage inhibition (PI)					
			15 th day	30 th day	45 th day	60 th day	75 th day	90 th day
1	0 – 12	3	36.57±7.10	60.59±9.24	73.67±4.09	74.00±2.54	68.97±3.02	67.64±2.90
2	12 - 24	7	45.07±4.62	66.60±2.36	76.02±2.25	72.76±2.66	71.11±2.99	69.53±3.20
3	24 - 36	11	48.58±3.53	60.66±2.93	71.26±1.79	70.61±1.42	65.31±3.15	63.96±3.09
4	36 - 48	5	46.89±4.19	62.10±6.36	70.87±4.18	70.54±3.48	69.72±3.25	68.90±3.79
5	48 - 60	4	35.55±4.92	54.92±3.75	73.13±1.97	67.83±2.78	62.23±5.34	60.96±5.29

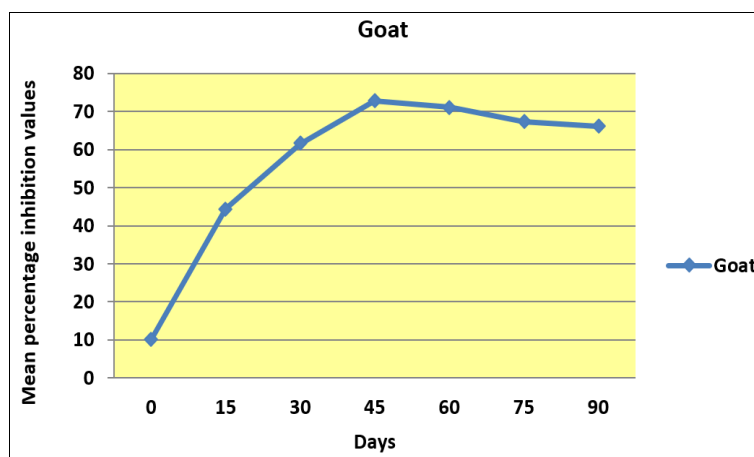


Fig 1: Post vaccination immune response in goats against PPR vaccine

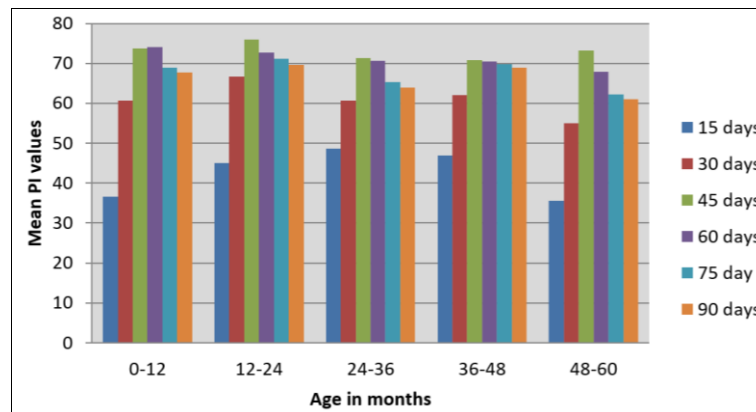


Fig 2: Age wise immune response in goats against PPR vaccine

Conclusion

From the current investigation, the following findings might be drawn: All goats who received the Sungri 96 strain of PPR vaccine developed protective Sero titers 30 to 90 days after receiving the vaccine. The peak antibody titers were reached on day 45 after vaccination, and protective antibody titres were maintained until 90 days after vaccination. The decline in antibody titers was noted between 60 to 90 days after immunization, overall immunological responses brought on by vaccination in the various age groups of the animals did not differ.

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