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POST-EXPOSURE *PESTE DES PETITS RUMINANTS* VACCINATION WITH CONCURRENT ANTIBACTERIAL THERAPY INFLUENCES THE DISEASE OUTCOMES FOLLOWING NATURAL EXPOSURE TO *PESTE DES PETITS RUMINANTS* VIRUS IN GOATS.

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ABSTRACT

The effects of post-exposure peste des petits ruminants (PPR) vaccination, with or without antibacterial treatment in the management of peste des petits ruminants outbreaks was investigated in West African dwarf goats. Twenty (20) naïve male goats divided into five (5) groups were used. Natural exposure to PPR virus was achieved by co-habiting experimental goats with bELISA-confirmed clinically sick goats. Following the onset of PPR clinical signs, the animals were treated as follows: Group A (Oxytetracycline); Group B (PPR vaccine); Group C (PPR vaccine and Oxytetracycline); while Groups D and E served as PPR positive and PPR negative controls, respectively. Clinical scores were evaluated daily. Haematological profiles and serum PPR specific antibodies were evaluated pre-exposure and on days 1, 3, 5, 7 and 14 post treatment. All the PPR exposed goats were seropositive for PPRV by day 1 post vaccination/treatment. The disease ran a peracute to acute course in all the exposed groups with overall clinical scores of 4.38; 7.05 and 6.98, in groups A, B and D, respectively, with 100% mortality. Group C had the least score (3.90) with 50% mortality. The total leukocyte count showed a leukopenia due to lymphopenia in groups A and D while groups B and C values were within normal range. The findings from this study show that post-exposure PPR vaccination of goats with concurrent antibacterial therapy may alter the clinical course of the disease, resulting in higher survivability. Hence this management approach should be encouraged in the face of an outbreak.

Keywords : *Peste des petit ruminants* virus; Post-exposure vaccination; West African dwarf goats; Haematology; PPR bELISA

INTRODUCTION

Peste des petits ruminants (PPR) caused by *peste des petits ruminants* virus (PPRV) is an economically important animal health challenge that ravage small ruminant production in endemic areas (Banyard *et al.*, 2010; Kumar *et al*., 2014). The vaccination of clinically sick animals is widely discouraged (Tizard, 2020) and as a result, PPR vaccination of clinically sick animal is not a common practice. Hence, its potentials in the management of PPR outbreaks have not been fully explored. While pre-exposure vaccination protects uninfected animals from infection, post-exposure vaccination may modify or prevent clinical course of disease among those who are already infected (Gallagher and Lipsitch, 2019), presenting it as a potential emergency management approach during outbreaks. This study evaluates the potentials of post-exposure PPR vaccination with or without concurrent antibiotic therapy, in the management of PPR in West African Dwarf (WAD) goats.

MATERIALS AND METHODS

Twenty (20) male WAD goats between 6-9 months were divided into five groups (n=4). The goats were exposed to PPR by allowing them to co-habit with bELISA-confirmed clinically sick animals at a ratio of 1:4 for 4 days (Jarikre *et al*., 2016). Following bELISA based confirmation of infection and onset of clinical sign of pyrexia in the experimental goats, group A was treated with Oxytetracycline (long acting) only; group B was vaccinated

using PPR vaccine Nigeria 75/1 strain; group C was vaccinated and treated with Oxytetracycline (long acting), concurrently; group D served as the PPR positive control (not vaccinated, not treated) while Group E served as the PPR negative control (not vaccinated, not treated). The animals were observed twice daily post-vaccination/treatment (pv/rx) for a period of 14 days. The clinical symptoms were carefully observed and their severity scored based on the demeanour, pyretic response, ocular/nasal discharges, oral lesions, diarrhoea and respiratory symptoms, according to a predetermined scoring guide for evaluation of the severity of PPR as described by Pope et al., (2013) with modifications. The Clinical score (CS) for each group was determined using the formular:

Clinical Score (CS) = Total Severity Score in group ÷ Total Death Time (days) in group.

The total death time for each group is the sum of the number of days pv/rx that each mortality in group was recorded. The haematological profiles (hematocrit, hemoglobin concentration, total erythrocyte counts, total leukocyte counts and differential counts) and PPR specific serum IgG levels (H-PPR bELISA) were determined pre-exposure (baseline) and on days 1, 3, 5, 7 and 14 post treatment/vaccination (pv/rx).

RESULTS AND DISCUSSION

The disease ran a peracute to acute course in all the exposed groups with resultant clinical scores of 4.38; 7.05 and 6.98, in groups A (Rx); B (Vac.) and D (+ve Ctrl), respectively, while group C had the least score (3.90) (Table 1). Also, 100% mortality was recorded in groups A, B and D on days 5, 7 and 3pv/rx, respectively, while group C survived till the end of the study with 50% mortality.

Table 1: Computed clinical scores for WAD goats exposed to PPRV and subsequently vaccinated and/or treated with oxytetracycline.

Group	Total Severity Score	Total death Time (Days)	Clinical Score
A (Rx)	92	21	4.38
B (Vac.)	141	20	7.05
C (Vac.+Rx)	187	48	3.90
D (+ve CTL)	83	12	6.98
E (-ve CTL)	0	0	0

The hematocrit (Ht), hemoglobin concentration (Hb) and total erythrocyte counts (TEC) evaluated during the course of this study all had values within the normal reference range for WAD goats. This finding is in tandem with the reports of Obi and Oduye (1985) and Omeh et al., (2017) which reported that there is no significant difference in the erythrocyte indices between PPR infected and apparently healthy WAD goats.

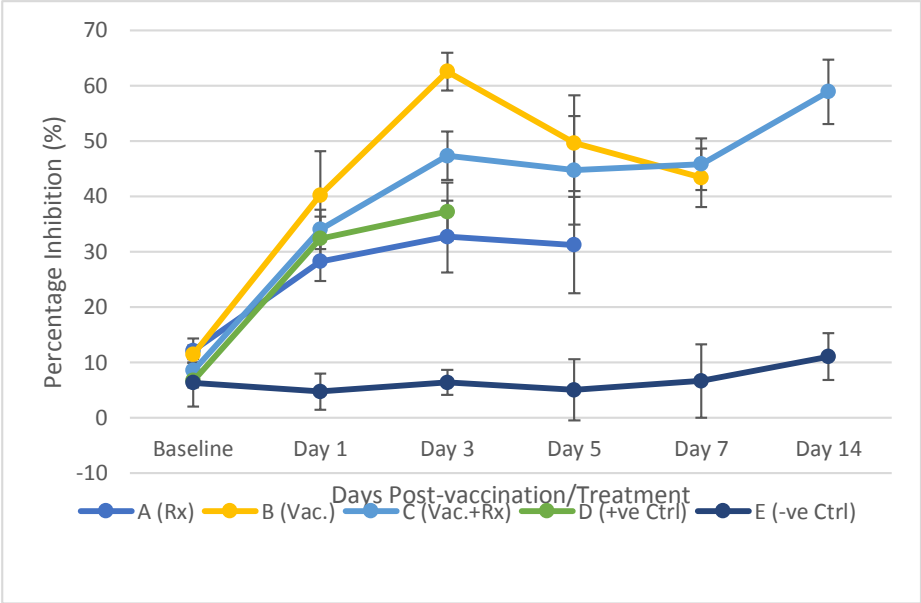

Figure 1. Mean percentage inhibition (PI) in west African dwarf (WAD) goats exposed to PPRV and subsequently vaccinated and/or treated with broad-spectrum antibiotics.

PPR specific antibodies were detected in all groups by day 1 pv/rx and peaked by day 3 pv/rx with Percentage inhibition (PI) of 32%, 62.6%; 37.25% in groups A, B and D, respectively. Group C plateaued on days 3, 5, 7 pv/rx and peaked on day 14 pv/rx with PI of 58.9% (Figure 1). This observation validates the report that co-habitation is a sure method of mimicking PPR field infections (Jarikre *et al*., 2016). The PPR specific serum IgG responses can not be assertively accrued to infection or vaccination since both will result in seroconversion.

The total leukocyte counts (TLC) showed a leukopenia due to lymphopenia in groups A and D. PPRV is known to cause leukopenia and consequently, immunosuppression in affected hosts due to its lympholytic activity in hosts lymphoid organs (Banyard et al., 2010; Kumar et al., 2014; Muthuchelvan et al., 2015). However, groups B (vaccinated) and C (vaccinated and treated) showed TLC within the normal range for goats. This suggests that the post exposure vaccinations were able to stimulate the host cellular immune responses and maintained the peripheral blood circulating leukocytes numbers within the reference values despite the lympholytic effects of the virus in the host lymphoid tissues.

CONCLUSION

In conclusion, the clinical scores, mortality pattern and leukocyte counts observed in this study shows that the post-exposure PPR vaccination of goats together with broad-spectrum antibacterial therapy concurrently, altered the course of the disease resulting in higher survivability than in the other goats that received only PPR vaccination or oxytetracycline treatment. Hence, this management approach should be encouraged in the face of an outbreak.

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