Haematological Parameters of Pregnant Kano Brown Does Vaccinated Against *Peste Des Petits Ruminants* in Nigeria

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Abstract: *Peste des petits ruminants* (PPR) is an endemic disease of small ruminants globally and, the disease controlled primarily by vaccination. The aim of this study was to determine the changes in haematological parameters of pregnant goats vaccinated against PPR. Ten pregnant female goats were obtained for the purpose of this study. The pregnant goats were at about the same stage of pregnancy, confirmed by ultrasonography. Vaccination using the Nigeria 75/1 PPR virus vaccine was done at first trimester of pregnancy. Protective antibodies against PPR were detected one week post-vaccination using competitive enzyme linked immunosorbent assay (c-ELISA). Blood samples were collected in sample bottles containing ethylenediaminetetraacetic acid (EDTA) before vaccination and at two weeks interval post-vaccination for ten weeks. Microhaematocrit and thin blood smear techniques were used for the haematological analyses. Haemoglobin concentration (Hb) was determined using the cyanmethaemoglobin method. Mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC) were calculated. There was no statistically significant difference in all the haematological parameters before and after vaccination against PPR. In conclusion, the vaccination of apparently healthy pregnant goats against PPR produced no alteration in the haemogram.

Keywords: *Peste des petits ruminants*, Haematological parameters, Pregnant, Vaccination, Blood.

INTRODUCTION

Peste des Petits Ruminants (PPR) is an acute and highly contagious viral disease of goats and sheep caused by PPR virus (PPRV), a member of the genus *Morbillivirus* in the family *Paramyxoviridae* (Fallahi, 2017). The virus is antigenically related to the rinderpest virus which affects cattle and other large animals (Fentahun and Woldie, 2012). High morbidity with signs of fever, necrotic stomatitis, gastroenteritis, pneumonia, and sometimes mortality are commonly observed (Kwaitek *et al*., 2007; Zaher and Ahmed, 2014). Vaccination has been suggested to be most effective way in the control of PPR (Fentahun and Woldie, 2012). This study aimed to determine the changes in haematological parameters of pregnant goats vaccinated against PPR.

MATERIALS AND METHODS

Animals Used for the Study

Ten Kano brown does were acclimatized for two weeks and pregnancy (first trimester) was confirmed using ultrasonography. The does were vaccinated using the Nigeria 75/1 strain PPR vaccine. Blood samples were collected via jugular venipuncture into labeled sample bottles containing ethylenediaminetetraacetic acid from two weeks post-vaccination at two weeks interval for up to ten weeks.

Haematological Analysis

The red blood cell (RBC) and white blood cells (WBC) counts were determined using haemocytometers. The packed cell volume (PCV) was determined using the microhaematocrit method. Haemoglobin concentration (Hb) was measured by the cyanmethaemoglobin method (Coles, 1986).

The mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH) and mean corpuscular haemoglobin concentrations (MCHC) were calculated as described by Coles (1986). The differential leucocytes (lymphocytes, neutrophils, eosinophils, basophils, and monocytes) counts were determined using a light microscope (OlympusXSZ-107BN) under high-power magnification with oil immersion following staining of the slides with Wright-Giemsa stain (Campbell and Ellis, 2007).

Statistical Analysis

The values obtained were subjected to column statistics and one-way analysis of variance (ANOVA) with Tukey's post-hoc test and $p < 0.05$ was considered significant.

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RESULTS

Table **1** shows the mean values of PCV, HB, RBC, WBC, Neutrophils, Monocytes, Lymphocytes, eosinophils, Basophils, MCV, MCH and MCHC in pregnant Kano Brown does before and after vaccination against PPR. There were no statistically significant ($P > 0.05$) variations in the mean values of the haematological parameters before and after vaccination except in the values of WBC. The mean WBC values increased significantly ($P < 0.05$) at week 2, decreased to pre-vaccination value at week 4 and further increased significantly ($P < 0.05$) at weeks 6, 8 and 10.

DISCUSSION

There was no significant alteration in all the haematological parameters in the pregnant does post-vaccination except for the WBC. Waziri *et al*. (2010) reported a significant increase in RBC in pregnant Sahel goats at weeks 16 and 20 of gestation. The no significance in RBC observed in this study might have resulted as these goats were in the second trimester of gestation despite vaccination suggesting that vaccination of pregnant goats against PPR has no significant effect on the RBC in the first and second trimester of gestation.

The PPR vaccine has been reported to produce only transient leukopenia without significantly affecting the immune response (Rajak *et al.,* 2005). The increase in the WBC was due to increase in lymphocyte count following vaccination. The increase in lymphocyte count following vaccination was necessary to enhance antibodies production as reported by Goronzy and Weyand (2013). Previous study in pregnant Sahel goats demonstrated increase in WBC during pregnancy resulting from increased bone marrow activity following pregnancy stress (Fortagne and Schafer, 1989; Waziri *et al*., 2010). However, in this study, the increase in WBC due to increase in lymphocytes might have been further enhanced by the vaccination.

CONCLUSION

The vaccination of pregnant Kano brown goats during the first trimester of gestation resulted in no significant alteration of the haematological parameters except for the WBC. It is therefore recommended that vaccination of pregnant goats against PPR could be carried out with no risk.

ETHICAL APPROVAL

This article contains studies with animals performed by any of the authors and ethical approval for this study was provided by the Ahmadu Bello University Committee on Animal Use and Care (ABUCAUC).

CONFLICT OF INTEREST STATEMENT

The authors declare that they have no conflict of interest.

Table 1: Haematological Parameters (Mean ± SEM) of Pregnant does at 2, 4, 6, 8 and 10 Weeks

	PreV	2 wks PV	4 wks PV	6 wks PV	8 wks PV	10 wks PV
PCV (%)	34.20 ± 1.47	30.70 ± 1.20	34.40 ± 1.11	32.90 ± 2.23	28.50 ± 1.04	29.50 ± 1.54
Hb (g/dl)	11.37 ± 0.49	10.20 ± 0.40	11.43 ± 0.37	10.94 ± 0.75	9.48 ± 0.35	9.83 ± 0.51
Total protein (g/l)	6.91 ± 0.20	7.06 ± 0.22	6.58 ± 0.35	6.76 ± 0.29	6.34 ± 0.15	6.88 ± 0.15
RBC (x 10^{12}/l)	5.63 ± 0.25	5.39 ± 0.22	5.75 ± 0.18	5.54 ± 0.38	4.69 ± 0.17	5.02 ± 0.26
WBC (x 10^{9}/l)	8.82 ± 0.78	10.67 ± 0.65[a]	7.64 ± 0.41	10.18 ± 0.95[a]	12.29 ± 0.82[b]	10.10 ± 0.89[a]
Neutrophils (x 10^{9}/l)	3.65 ± 0.26	4.17 ± 0.32	2.90 ± 0.20	3.18 ± 0.51	3.18 ± 0.24	3.09 ± 0.28
Lymphocytes (x 10^{9}/l)	5.04 ± 0.50	6.22 ± 0.42[a]	6.54 ± 0.28[a]	6.66 ± 0.67[a]	7.78 ± 0.67[a]	6.85 ± 0.72[a]
Monocytes (x 10^{9}/l)	0.11 ± 0.08	0.15 ± 0.06	0.07 ± 0.04	0.10 ± 0.05	0.25 ± 0.09	0.09 ± 0.06
Eosinophils (x 10^{9}/l)	0.10 ± 0.03	0.07 ± 0.07	0.11 ± 0.06	0.23 ± 0.12	0.28 ± 0.18	0.07 ± 0.04
Basophils (x 10^{9}/l)	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
MCV	60.81 ± 0.62	57.07 ± 1.01	59.83 ± 0.45	59.40 ± 0.86	60.80 ± 0.63	58.78 ± 0.59
MCH	20.22 ± 0.21	18.96 ± 0.33	19.88 ± 0.15	19.75 ± 0.28	20.22 ± 0.21	19.59 ± 0.23
MCHC	33.25 ± 0.02	33.23 ± 0.03	33.23 ± 0.02	33.24 ± 0.03	33.26 ± 0.03	33.33 ± 0.11

Values with different superscripts in the same row are statistically different ($p < 0.05$) from pre vaccination. PreV - pre-vaccination. PV - post-vaccination.

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