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## Effect of Human Menopausal Gonadotropin on Haematological and Serum Biochemical Parameters of Nigerian Indigenous Chickens

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**Abstract:** The present study was conducted to evaluate the haematological and serum biochemical parameters of Nigerian indigenous chickens. Twenty five healthy cocks were randomly assigned to five treatments consisting of intramuscularly administered 6.0, 12.0, 18.0, 12.0 I.U of Pergonal® and sterile water (control). At the end of the three week experimental period, five birds from each group were bled weekly from the wing veins for haematology and serum biochemistry. Results of this study showed no significant differences ( $P > 0.05$ ) in haematological parameters between the treatments. Serum total protein, albumin, urea and electrolytes differed significantly ( $P < 0.05$ ) between the treatments. However, the values were within normal range, indicating that Pergonal® had no deleterious effect on these parameters.

**Key words:** Chickens, haematology, Nigeria, Pergonal®, serum biochemistry

### Introduction

For several decades, natural or synthetic hormones have been used to improve the productive and reproductive potentials of animals. In reproductive management of farm animals, human menopausal gonadotropin (pergonal®) is often used in superovulatory protocols (Ladda *et al.*, 1999) and reported to be effective in improving semen quality of local cocks (Abu *et al.*, 2006). Pergonal® is a lyophilised gonadotropin preparation and consists of follicle stimulating hormone and luteinizing hormone in ratio of 1:1 (Dixon and Hopkins, 1996). However, there is a concern that hormones used repeatedly in animal production endanger the health of animals and man. Haematological and serum biochemical parameters provide valuable information on the health status of animals (Kral and Suchy, 2000) and also reflect an animal's responsiveness to its internal and external environment (Esonu *et al.*, 2001). The effects of such steroid hormones as androgens and estrogens on haematological values are well documented (Khan and Zafar, 2005). Though studies have been conducted on the haematological parameters of Nigerian domestic chickens (Ikhimioya *et al.*, 2000), there is no information on the effect of human menopausal gonadotropin on such values. Therefore, this study was carried out to evaluate the effect of Pergonal® on haematological and serum biochemical parameters of Nigerian indigenous chickens as well as to contribute to knowledge on avian haematology.

### Materials and Methods

**Animals and experimental design:** A total of twenty-five

mature and healthy local cocks were purchased from the open market and used for this study. The birds were dewormed and vaccinated soon after purchase and were allowed to stabilize for one week. The birds were housed individually in cages and fed commercial growers' mash. Water was provided ad libitum. The cocks were assigned randomly to five treatments: T<sub>1</sub>, (control), T<sub>2</sub>, T<sub>3</sub>, T<sub>4</sub>, and T<sub>5</sub> whereby cocks in each group were administered intramuscularly normal saline solution, 6.0, i.u, 12.0, i.u, 18.0, i.u, and 24.0, i.u of Pergonal® respectively. The injections were given weekly for three weeks.

**Blood sample collection and analysis:** Samples of blood were collected from brachial veins using sterile syringes and needles. Immediately after collection, blood samples were transferred into set of sterile tubes containing anticoagulant (disodium salt of ethylene diamine tetra acetic acid) for the determination of haematological parameters and another set of tubes without anticoagulant for serum biochemistry.

Packed cell volume (PCV; haematocrit) of each sample was determined by the microhaematocrit method. Haemoglobin concentration was photometrically determined at the wavelength of 540nm. Erythrocyte (RBC) and leucocyte (WBC) counts were done using improved Neubauer haemocytometer. Differential leucocyte counts were determined by the thin slide method. Erythrocytic indices were calculated according to the methods described by Schalm *et al.* (1975). Serum total protein, albumin, urea and some electrolytes were determined photometrically using commercial kits.

Table 1: Haematological values of pergonal® treated cocks

Parameters	T <sub>1</sub> (saline solution)	T <sub>2</sub> (6.0 i.u)	T <sub>3</sub> (12.0 i.u)	T <sub>4</sub> (18.0 i.u)	T <sub>5</sub> (24.0 i.u)
PCV (%)	34.54±0.52 <sup>a</sup>	34.59±0.06 <sup>a</sup>	34.61±0.02 <sup>a</sup>	34.61±0.02 <sup>a</sup>	34.64 ±0.04 <sup>a</sup>
Hb (g/dl)	9.37±0.01 <sup>ab</sup>	9.36±0.05 <sup>ab</sup>	9.36±0.01 <sup>ab</sup>	9.36±0.05 <sup>ab</sup>	9.39 ±0.00 <sup>ab</sup>
RBC (x10 <sup>6</sup> /ul)	2.80±0.07 <sup>b</sup>	2.90±0.00 <sup>b</sup>	2.82±0.03 <sup>b</sup>	2.93±0.03 <sup>b</sup>	2.78 ±0.17 <sup>b</sup>
MCHC (g/dl)	27.05±0.01 <sup>bc</sup>	27.07±0.00 <sup>bc</sup>	27.07±0.01 <sup>bc</sup>	27.09±0.00 <sup>bc</sup>	27.09 ±0.01 <sup>bc</sup>
MCV (fl)	116.66±0.01 <sup>c</sup>	116.67±0.00 <sup>c</sup>	116.68±0.00 <sup>c</sup>	116.69± 0.00 <sup>c</sup>	116.69 ± 0.00 <sup>c</sup>
MCH (pg)	31.58±0.01 <sup>d</sup>	31.56±0.01 <sup>d</sup>	31.56±0.00 <sup>d</sup>	31.59±0.00 <sup>d</sup>	31.59±0.00 <sup>d</sup>
WBC(x10 <sup>3</sup> /ul)	9.30±0.00 <sup>c</sup>	9.50±0.01 <sup>c</sup>	9.62±0.01 <sup>b</sup>	9.62±0.03 <sup>b</sup>	9.64±0.03 <sup>a</sup>
Lymphocytes (%)	58.00±0.21 <sup>a</sup>	56.00±0.21 <sup>b</sup>	55.00±0.15 <sup>c</sup>	55.00±0.16 <sup>c</sup>	53.00±0.22 <sup>d</sup>
Heterophils (%)	29.00±0.18 <sup>d</sup>	30.00±0.11 <sup>c</sup>	31.00±0.02 <sup>b</sup>	31.00±0.00 <sup>b</sup>	33.00±0.44 <sup>a</sup>
Eosinophils (%)	7.00±0.29 <sup>d</sup>	7.00±0.11 <sup>c</sup>	7.00±0.21 <sup>a</sup>	7.00±0.03 <sup>a</sup>	7.00±0.04 <sup>a</sup>
Basophils (%)	1.00±0.00 <sup>b</sup>	2.00±0.58 <sup>b</sup>	2.00±0.45 <sup>b</sup>	2.00±0.00 <sup>b</sup>	2.00±0.00 <sup>b</sup>
Monocytes (%)	5.00±0.00 <sup>c</sup>	5.00±0.00 <sup>c</sup>	5.00±0.01 <sup>c</sup>	5.00±0.01 <sup>c</sup>	5.00±0.02 <sup>c</sup>

Mean values within the same row with the same superscripts are not significantly different at P = 0.05

Table 2: Serum biochemistry and electrolytes of pergonal® treated cocks

Parameters	T <sub>1</sub> (saline solution)	T <sub>2</sub> (6.0 i.u)	T <sub>3</sub> (12.0 i.u)	T <sub>4</sub> (18.0 i.u)	T <sub>5</sub> (24.0 i.u)
Total protein (mg/dl)	8.2 ±0.30 <sup>a</sup>	8.10 ±0.22 <sup>b</sup>	7.8±0.23 <sup>c</sup>	7.7 ±0.65 <sup>d</sup>	7.6 ±0.27 <sup>e</sup>
Albumin (mg/dl)	3.5 ±0.22 <sup>a</sup>	3.2 ±0.22 <sup>d</sup>	3.4±0.22 <sup>b</sup>	3.3 ±0.09 <sup>c</sup>	3.1 ±0.27 <sup>e</sup>
Urea (mg/dl)	53.20 ±0.27 <sup>b</sup>	54.08 ±0.11 <sup>a</sup>	42.41±0.20 <sup>b</sup>	44.18 ±0.21 <sup>b</sup>	30.46 ±2.51 <sup>b</sup>
Sodium (mmol/l)	135.14 ±0.22 <sup>a</sup>	132.10 ±0.22 <sup>ab</sup>	134.14±0.22 <sup>b</sup>	133.04 ±0.09 <sup>b</sup>	131.30 ±0.27 <sup>c</sup>
Chloride (mmol/l)	132.30 ±0.27 <sup>a</sup>	130.38 ±0.17 <sup>c</sup>	131.30 ±0.27 <sup>b</sup>	131.32 ± 0.16 <sup>b</sup>	130.78 ± 0.38 <sup>c</sup>
Potassium (mmol/l)	1.44 ±0.17 <sup>b</sup>	1.74 ±0.15 <sup>a</sup>	1.44 ±0.09 <sup>b</sup>	1.63 ± 0.03 <sup>ab</sup>	1.43 ±0.02 <sup>b</sup>
Bicarbonates (mmol/l)	13.44 ±0.38 <sup>b</sup>	14.34 ±0.42 <sup>c</sup>	15.08 ±0.11 <sup>ab</sup>	15.44 ±0.33 <sup>a</sup>	15.60 ±0.22 <sup>a</sup>
Phosphates (mmol/l)	17.50 ±0.26 <sup>a</sup>	16.62 ±0.35 <sup>bc</sup>	16.20 ±0.27 <sup>bc</sup>	16.40 ±0.27 <sup>bc</sup>	16.14 ±0.06 <sup>c</sup>

Mean values ± S.D. within the same row with the same superscripts are not significantly different at P = 0.05.

**Statistical analysis:** All data were subjected to analysis of variance (ANOVA) according to the standard procedure described by Steel and Torrie (1980). Duncan multiple range test was used to compare treatment means found to be statistically significant at P = 0.05 (Obi, 1990).

## Results and Discussion

The effect of Pergonal on haematological parameters is presented in Table 1. There were no significant differences ( $P > 0.05$ ) in PCV between the treatments. Packed cell volume (haematocrit) is the most reliable measure of the red cell status (Anosa and Isoun, 1978). Results of the present study indicate that PCV were within the range given by Oyewale (1987) and Islam *et al.* (2004) for Nigerian and Bangladeshi indigenous chickens respectively. The PCV value was also consistent with the findings (28-37%) of Simaraks *et al.* (2004) for their local chickens.

However, a slight decrease ( $P > 0.05$ ) in RBC was observed when 24.0 i.u was injected. Haemoglobin concentration (Hb) and red blood cell count (RBC) did not increase significantly ( $P > 0.05$ ) when varying doses of Pergonal® were administered to the birds. The values were in agreement with those (8-10, 2-3) reported by Simaraks *et al.* (2004) and the range (70-13.0, 25-3.5 respectively) provided by Jain (1993). Previous studies showed that variations in haemoglobin and red blood cell counts are attributed to season and species differences (Agaie and Uko, 1998), nutritional status

(Iheukwuemere *et al.*, 2002) and management (Ikhirimioya *et al.*, 2000). Thus variations are normal findings of red cell status depending on the present physiological state of the birds. Erythrocytic indices did not differ significantly ( $P > 0.05$ ) between the treatments and were consistent with the findings of Simaraks *et al.* (2004).

The mean values for leucocyte counts (WBC) in all the treatments were within the values reported by Simaraks *et al.* (2004) and Jain (1993). The higher eosinophil and low lymphocyte counts observed in the present study are consistent with an earlier finding in Nigerian local chicken (Oyewale, 1987). Although there were mean differences in heterophils and lymphocytes between the treatments, the values were within normal range, suggesting that these blood cells can still perform their phagocytic and immune functions.

Serum biochemistry profiles and electrolytes of Nigerian indigenous chickens are presented in Table 2. Results showed that there were significant differences ( $P < 0.05$ ) in serum total protein, albumin and urea concentrations between the treatments. Serum total protein and albumin were in agreement with the values reported by Durotoye *et al.* (2000), but total protein was higher than the value given for Thai local chickens (Simaraks *et al.*, 2004). Urea concentrations were higher than the values given by Durotoye *et al.*, (2000). The high total protein and urea values of the birds used for the present study perhaps indicate the adequate nutritional status of the birds.

There were significant differences ( $P < 0.05$ ) in Na, K, chloride, bicarbonates and phosphates. Serum electrolytes play important roles in physiological processes involved in homeostasis. Sodium and potassium were within the ranges reported by Durotoye *et al.* (2000). But bicarbonate and phosphate levels were slightly lower than the values stated by these investigators. Serum chloride was however, higher than the range (114-120) reported in Thai chickens by Simaraks *et al.* (2004). Variations in serum electrolytes, though within narrow limits are attributed to breed or species differences, age, sex, nutrition, management and location (Olayemi *et al.*, 2002).

**Conclusion:** The results of this study suggest that human menopausal gonadotropin (Pergonal®) had no deleterious effect on haematological and biochemical parameters of Nigerian indigenous chickens. However, some toxicological and safety studies on the use of those gonadotropin can be conducted.

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