

Gestation Effects on the Hematological and Biochemical Profile of Nubian Ibex (*Capra Nubiana*)

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Abstract The aim of this study was to investigate effect of gestation periods on the hematological and biochemical parameters in adult captive wild (*Capra nubiana*), a group of 21 Nubian ibex was selected for the study. The mean values of the different (RBC) and (WBC) showed significant changes during gestation. (RBC), (PCV) and (Hb) increased while total (WBC) and segmented neutrophils increased after the second gestation period in the second period. The numbers of total leucocytes and segmented neutrophils increased after the second period. The concentration of the (AST) was declined during progression of gestation, On the other hand the concentration of (ALT) was increased and arrived maximum concentration at second period of gestation.

Keywords Nubian Ibex, Pregnancy, Gestation, Haematology, Biochemistry

1. Introduction

In Saudi Arabia, few systematic records have been made, most of the information (data) was exhibited from brief aerial and ground exploration survey made to locate populations. Among the 15 sites where ibex has been found, major concentrations are observed in the western mountains of the Arabian shield with isolated populations located in the north, north-central and central regions. Only scattered observations have been made in the south (Aleissa M, 2011). There is no accurate population estimation, but the overall numbers are believed to be decreasing in the area where ibex species is not protected. Gestation lasts about five months and the majority of young are born in March (The Ultimate Ungulate Page (January, 2006)). A litter size of one is usual, but twins and, very rarely, triplets occur (University of California, San Diego: School of Medicine (January, 2006)). Sexual maturity is reached at two to three years, and offspring then leave their natal herd. Hunting, livestock, extension of the road and other development pressures are fundamentally degrading habitat in Saudi Arabia.

Lack of information is found regarding the hematological parameters of Ibex species (Perez's et al., 2003). However few reports on biochemical baseline information for the genus *Capra* is available, none is available for the species *Capra nubiana*. (Perez's et al. 2003) studied the hematological parameters of the Spanish Ibex. The study of the Hematological and biochemical profiles is a vigorous di-

agnostic assistance. It is well known fact that factors such as breed, sex, age, behavior, handling, physiological changes and the period of the day, can influence the cellular constituents and serum biochemistry of the blood (Roy, 2010).

The aim of this study was undertaken to collect and evaluate selected biochemical and hematological parameters of captive *Capra nubiana* Ibex under the effect of the first, second and third period of pregnancy. Mean values obtained for each hematological variable during the different periods of pregnancy were compared for each breed to establish reference values during gestation.

2. Materials and Methods

The animals used in this study were 21 adult pregnant females (aged 4-7 years old), all were clinically normal and healthy *Ibex (Capra nubiana)* weighing 40-50 kg. The animals were kept at King Khalid Wildlife Research Center nearby Riyadh, Saudi Arabia. They were fed on a ration of dried lucerne and commercial concentrate (crude protein 16%), with free access to water. All females were routinely vaccinated against infectious diseases and given coccidiostats and anthelmintic drenches as necessary. Females were divided into three groups, each consisting of 7 females. The first group was considered to be 30-60 days of gestation, the second 60-90 days and the third 90 forward.

Blood samples (10 ml), were collected from each ibex by jugular vein puncture into clean vacuum tubes (Becton, Dickinson and Co., USA) containing EDTA-K₂, while the animal was manually restrained. Each tube was inverted 2-3 times to ensure thorough mixing. The samples were analyzed within 2 h in the laboratory using an automated hematology analyzer (VetScan HM2; Abaxis Veterinary Diagnostics).

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Each sample was analyzed for RBC and Hemoglobin (Hb), by Counter Model ZM (Coulter Electronics Ltd., Luton, Bedfordshire, United Kingdom).

All samples were evaluated on the same day. Blood samples for biochemical analyses were centrifuged at 3,000 rpm for 10 min, and the serum was decanted. Then the biochemical parameters were obtained using the biochemistry analyser VetScan VS2 (Abaxis Veterinary Diagnostics, Union City, CA 94587, USA).

Serum samples were analysed by automated analyser Robonik ASP-1300 for aspartate aminotransferase (AST), alanine aminotransferase (ALT), glucose, total serum protein calcium (Ca), inorganic phosphorus (P) and total serum proteins (TP). The results are obtained within 10–15 min for each rotor.

3. Statistical Analysis

Each treatment was composed of 21 replicates ($n = 21$). Standard Error (SE) was calculated for each parameter. The statistical analysis was followed by LSD test.

4. Results and Discussion

Effects of pregnancy on the Hematological and biochemical profile of the pregnant Nubian ibex are summarized in table 1. The (RBC), (Hb), (PCV) and (MCV) were significantly decreased during pregnancy this finding is compatible to the study by (Calvo *et al.* 1989) haemoglobin decreased significantly during first half of gestation time, with the lowest values in the second period. Haemoglobin

values decrease during pregnancy not only due to the utilization of the mother's haemoglobin into foetal circulation, but also due to dilution of blood which occurs as a consequence of plasma volume increase (Roy *et al.*, 2010) Singh *et al.*, (1991). (PCV) and (MCV) were also significantly decreased during pregnancy. MCV showed significant difference in the first and second period of gestation at ($p < 0.05$).

Red blood cells count (RBC), packed cell volume (PCV) and haemoglobin concentration (Hb) increased in the second period of pregnancy compared to first period and decreased in the last period for (RBC) and (Hb). A raise in (PCV) appeared in the second and third gestation period, which was significantly different only compared to the first period. (Hb) concentration was also increased in the second period and differed significantly from the third period. (MCV) was higher in third gestation period, different significantly from the control group and the second gestation period. In the first period, (MCV) was significantly lower than the other periods. (MCH) was reduced during second gestation period and being significantly different from the control group and the other pregnant groups. Fetal development that occurs in that period of pregnancy produces a greater oxygen demand. This greater need for oxygen is compensated by the endocrine system that stimulates the release of erythropoietin (Ep), which it is the primary regulator of erythropoiesis in the mammalian fetus and the adult as described by (Gordon *et al.*, 1973), (Zanjani *et al.*, 1974). In the adult, the kidney represents the major site of (Ep) production (Jacobson *et al.*, 1957). The secretion of this circulating glycoprotein stimulates increased production of RBC in the bone marrow (Walter., 2009).

Table 1. Hematological and Biochemical change in different periods of gestation for Nubian ibex

Parameters	Control	1 st period (30-60) days	2 nd period (60-90) days	3 rd period (91- forward) days
RBC($\times 10^6$ /ml)	11.8 \pm 1.78	10.7 \pm 1.22	11.57 \pm 0.26	9.09 \pm 0.12*
WBC($\times 10^3$)	9.07 \pm 1.5	12.5 \pm 2.7	14.4 \pm 0.32*	9.2 \pm 0.66
Hb(g/dl)	14.4 \pm 3.7	12.4 \pm 0.16	13.06 \pm 0.16	12.16 \pm 0.22
PCV (%)	49.32 \pm 0.17	33.31 \pm 0.17*	40.7 \pm 0.15*	41.72 \pm 0.13
MCH (pg)	30.5 \pm 3.3	30.36 \pm 0.23	29.4 \pm 0.12	34.2 \pm 0.26*
MCV (fl)	31.4 \pm 2.0	15.8 \pm 0.13*	21.4 \pm 0.12*	22.2 \pm 0.32
Neutrophil (%)	32.2 \pm 6.7	37.32 \pm 0.41	39.33 \pm 0.24*	51.32 \pm 36*
Monocytes (%)	2.7 \pm 2.8	5.50 \pm 0.38	7.20 \pm 0.23*	4.30 \pm 0.23
Eosinophil's (%)	1.9 \pm 6.1	1.3 \pm 0.12	1.38 \pm 0.24*	1.14 \pm 0.18
Glucose(mg/dl)	130 \pm 11.6	128.6 \pm 10.2	129.8 \pm 2.6	127.6 \pm 34
TP (g/dl)	7.6 \pm 3.2	6.40 \pm 0.21	5.3 \pm 0.24	4.62 \pm 0.23
AST (U/L)	270 \pm 118.7	265 \pm 18.6	263 \pm 2.1	260 \pm 3.64*
ALT (U/L)	38.9 \pm 8.6	40.30 \pm 2.76	45 \pm 2.11*	40.32 \pm 2.7
Calcium (mg/ dl)	10.2 \pm 2.1	9.75 \pm 0.42	10.4 \pm 0.31	10.3 \pm 0.38
Phosphorus (mg/dl)	6.2 \pm 4.7	6.40 \pm 2.6	6.30 \pm 1.2	6.52 \pm 2.11

Data are expressed as mean \pm standard deviation; *P < 0.05 between different periods of pregnant and normal Ibex.

The reduction in (RBC), (PCV) and haemoglobin, occurs in the third period of gestation, which represents the main cause of “pregnant physiological anemia” a clinical condition described in various species (Victor et al., 2007). This phenomenon was observed in this study, in which these hematological variables decreased during the last gestation period. The mean cell hemoglobin (MCH) was increased. Similarly as described by (Mbass a and Poulsen., 1991) observed that MCH and MCHC increased during late pregnancy of Danish landrace goats, and as mentioned by (Azab and Abdel-Maksoud., 1999), they detected elevated (MCH) in goats, This could prevent a marked decrease in total oxygen carrying capacity of circulating blood. There was a statistically significant increase in total leukocytes during the second period, whereas significant decrease in the third gestation period. In the advanced stage of gestation, there is an endogenous adrenaline release which encourages the greater utilization of neutrophils in the circulation resulting in an increase in total leucocyte count (Kramer, 2000). Segmented neutrophils were significantly increased in third period in relation to the other groups. Monocytes increased significantly in the first and second period of gestation, but less increased value was observed in the third period. Eosinophils were higher in the control group than in the different gestation groups.

Blood glucose concentrations were almost clamped at the basal levels during all periods. Concentrations were 128.6 ± 10.2 , and 129.8 ± 2.6 for first and second periods respectively and was 127.6 ± 3.4 for late pregnant

(ALT) increase in the first and second period but decrease in the third period, so its significantly different at $p < 0.05$ for this period. The concentration of (ALT) was high, this might be due to the release of this enzyme from placenta and uterus and decreased (AST) activity throughout the gestation period was due to uterine and hormonal changes during gestation period. The results are conformity with the results of (Talvekar et al. 2008). A non-significant decrease in plasma total protein content from in all different periods of gestation. Our results demonstrated no variations in the calcium and inorganic phosphorus values during the gestation period, which suggests that homeostatic mechanisms were effective. (Reese et al. 1984) obtained calcium and phosphorus level similar to our results during pregnancy.

The obtained results could serve for a better understanding of biochemical processes in non-pregnant and pregnant Ibex, for estimating their physiological status and for diagnostic purposes.

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