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Research Article

Effect of Physiological Status in Some Haematological and Biochemical Parameters in Desert Goats

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ABSTRACT

The aim of this study was to investigate the effect of gestation, parturition and postpartum on some haematological and biochemical parameters were studied using 15 (10 pregnant of known gestation age while 5 animal remained as cycling non-pregnant control) desert does aged between 2-3 years and managed under controlled condition. Their weights 30± 2.1 kg. The results obtained revealed that, during pregnancy the erythrocytic parameters decreased except ESR was increased during this period. Then all these parameters markedly decreased during the day of parturition period without significant changes in MCH and MCHC, except ESR was increased. Also found the same result during the postpartum period without significant changes in TRBC and ESR. Leukocytes increased at the day of parturition and their relative distribution showed neutophilia. Serum Total protein, globulin, urea markedly decline during the late pregnancy and Creatinine, ALT and AST was increased in this period. Serum glucose, urea, ALT and AST were significantly increased during the day of parturition and decline the glucose level in postpartum period. It can be concluded that pregnancy, parturition and postpartum period are a accompanied with marked changes in some haematological and biochemical parameters but female goat can adapt to marked variation in some important parameters during these physiological stages by different physiological mechanism.

Key words: Physiological status: Haematology: Biochemistry: desert goats

INTRODUCTION

Examining blood for their constituents is used to monitor and evaluate health and nutritional status of animals (GUPTA *et al*., 2007). The significance and the great variation in the haematological and biochemical indices observed between breeds of goats has been well documented (Azab and Abdel-Maksoud, 1999; Tambuwal *et al*., 2002).

Nutrition, age, sex, genetics, reproductive status, housing, starvation, environmental factors, stress and transportation are known to affect haematological and biochemical parameters (Balikci *et al*., 2007).

These differences have underscored the need to establish an appropriate physiological baseline values for various breeds of livestock including the desert goat which could be used in the realistic evaluation of the management practice, nutrition and diagnosis of health condition.

These goats are indigenous to arid and semi- arid of Northern and savannah regions of western Sudan (Darfur and Kordofan), Eretria and west ward in Chad. They comprise 27% of the goat population of country. The goat colour varies from white to black and grey colour is the most common (FAO, 1999).

Much of the available information on the haematological and biochemical studies on the blood of normal desert goat has been studied (Babeker *et al*., 2011), the aim of the present study was to assess and determine changes in some haematological and serum biochemical values for non pregnant and pregnant desert goats across the gestation, parturition and postpartum period.

MATERIALS AND METHODS

Animals: Fifteen adult female desert goats healthy, cyclic aged between 2-3 years with an average body weight 30±2.1kg. The animals divided into groups, (group A consist of ten pregnant does) and (group B consist of five none pregnant does) and one desert buck. All animals were apparently healthy on clinical examination, all

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animals were dosed against internal parasite by (Ivomec®) One ml injected subcutaneous. Each group of animals was housed in semi closed pens at the farm of the Faculty of Veterinary Science, University of Nyala. The group A was kept with male before the pregnancy and separate after pregnancy. The feeding regime were based on grazing on natural pasture and supplemented with concentration (sorghum grain, groundnut cake, wheat bran) was offered on 250g per head daily.

Pregnancy occurrence

The group A does were synchronized for oestrous following (Arthur *et al*., 1989) by: Prostaglandin (Estrumate®) 1ml dose intramuscular (IM) and repeat the same injection after 11 days. And served naturally by health active desert buck (Arthur *et al*., 1989).

Non return to oestrous was considerate as an indication for conception. Ten does that became pregnant were group A, while five animals remained as cycling non pregnant were group B.

Blood samples

Blood samples were collected via the external jugular vein from each animal into plan containing (EDTA) to obtain serum and uncoagulated blood for biochemical and hematological analysis respectively. Blood samples were collected after pregnancy and the blood samples were collected every two weeks unit the end of pregnancy, the day of parturition and every weeks from postpartum period for five weeks.

Hematological and biochemical parameters

Red blood cell count (RBCs) in 10^6cell/µL, Haemoglobin concentration (Hb) in g/dl, packed cell volume (PCV) in %, Mean corpuscular volume (MCV) in femtolitter (fl), Mean hemoglobin concentration (MHC) in picogram (pg), Mean corpuscular hemoglobin concentration (MCHC) in g/dl, Total white blood cell (WBCs) in 10^3cell/µl, Differential leukocyte count (DLC) in % glucose assessment and Albumin, urea, Total protein, Creatinine were all determined according to the method described by (Jain, 1996), while ALT and AST were determined according to the method described by (Bergermeyer *et al*., 1986).

Statistical analysis

The data obtained were presented as mean ± standard Error, data obtained were subjected to Student t- test using Graph pad Prism software version 16. Test carried out at 95% level of confidence (P<0.05).

RESULTS

The erythrocytic series: The effect of physiological status on erythrocytic series were presented in table (1), the TRBCs was significantly higher (P<0.05) at control group and postpartum than the other. No variation was occurred between the early stage, late stage and the day of parturition. The PCV was significantly higher (P<0.05) at the control group, followed by the postpartum. The lower value was showed at the early stage. No significant difference (P>0.05) between the mean of the late stage and the day of parturition. The result of Hb was showed significant higher at (P<0.05) in the control group and the late stage of pregnancy. There was no statistical difference between the early stage, day of parturition and postpartum period. There was significant higher in ESR at the day of parturition, early stage of pregnancy and late stage of pregnancy. No variation between the postpartum period and control group. The result of MCV was showed significant higher at (P<0.05) in the control group and followed by the late stage of pregnancy. But the value obtained at the early stage was significant lower (P<0.05) than other stages. No significant between the day of parturition and postpartum period.

The MCH was showed significant higher (P<0.05) at the control group, followed by the late stage and the day of parturition. But no significant variation between the postpartum period and the early stage of pregnancy. The result of MCHC was significant higher (P<0.05) at the early stage. But the lower value occurred at the postpartum period. No significant difference between the late stage, day of parturition and control group.

The Leukocytic series

Table (2) shows a significant higher of TWBCs count at (P<0.05) in day of parturition. But the lower value was observed at the postpartum period. No variation between the early stage, late stage and control group. The differential count of leukocyte was presented in table (2), the neutrophils percentage was significant higher at (P<0.05) in the day of parturition. No significant difference between the other stages. The result of the eosinophils, basophils, lymphocyte and monocyte were showed no variation between the physiological status.

Some biochemical parameters and enzymes:

Result of some biochemical and enzymes are shown in Table 3. The highest value of glucose was observed in the day of parturition followed by the late stage of pregnancy ones. The lowest value was observed in the postpartum period. During the late stage of pregnancy observed the lowest value of total protein than the other periods. No variation was occurred between the other physiological status.

There was no significant variation between the different physiological stages in the value of albumin. The lowest value of globulin was observed at late stage of pregnancy than other stages. No variation between the other physiological status. The day of parturition was showed highest value of urea at (P<0.05) than other stages. But the late stage pregnancy was showed a lowest value at (P<0.05) than other stages. No variation between early stage of pregnancy, postpartum and control group.

The late stage of pregnancy was showed a highest value of Creatinine at (P<0.05) than other stages and no variation between other stages.

The highest values of ALT at (P<0.05) were observed in day of parturition followed by late stage of pregnancy and early stage of pregnancy ones. No difference between postpartum period and control group.

The highest values of AST at (P<0.05) were found in day of parturition followed by late stage of pregnancy ones. The lowest value observed in the postpartum period. No variation between control group and early stage of pregnancy.

Table 1: Mean (M) Erythrocytic series at the different of physiological status

Physiological status	Early stage of pregnancy	Late stage of pregnancy	Parturition	Postpartum period	Non pregnant Non lactating	Standard Error (SE)	Significance level
Parameters							
TRBC 10^6cell/µl	12.50^b	12.20^b	12.76^b	13.07^a	13.56^a	0.11	*
PCV %	24.55^c	25.50^b	25.40^b	26.56^{ab}	29.90^a	0.29	*
Hb g/dl	8.70^c	9.0^b	8.98^c	8.82^c	10.47^a	0.12	*
MCV (Fl)	19.15^b	20.58^{ab}	19.60^b	19.94^b	21.45^a	0.14	*
MCH (pg)	6.90^b	7.32^a	7.10^a	6.72^b	7.37^a	0.05	*
MCHC g/dl	35.08^a	34.93^b	34.80^b	32.80^c	34.70^b	0.10	*
ESR ml /H	1.08^b	1.08^b	2.40^a	0.94^c	0.10^c	0.06	*

a, b ,c within the same row followed by different superscript are significantly different; * = significant at P<0.05; NS = No significant at P<0.05; TRBC = Total Red Blood Cell; PCV = Packed Cell Volume; Hb = Haemoglobin; MCV = Mean Corpuscular Volume; MCH = Mean Corpuscular Haemoglobin; MCHC = Mean Corpuscular Haemoglobin Concentration; ESR = Erythrocyte Sedimentation Rate.

Table 2: Mean (M) Leukocytic series at the different of physiological status.

Physiological status	Early stage of pregnancy	Late stage of pregnancy	Parturition	Postpartum period	Non pregnant Non lactating	Standard Error (SE)	Significance Level
Parameters							
TWBC 10^3cell/µl	9.25^b	9.40^b	10.20^a	8.94^c	9.40^b	0.10	*
Neutrophils %	43.05^b	41.55^b	49.40^a	44.06^b	40.45^b	0.56	*
Eosinophils %	2.88	2.95	2.90±	2.78	2.55	0.11	NS
Basophils %	0.0	0.0	0.0	0.0	0.0	0.0	NS
Lymphocyte %	53.60^a	55.35^a	49.60^b	52.96^a	56.60^a	0.55	NS
Monocyte %	1.63	1.10	1.30	1.06	1.40	0.09	NS

a, b ,c mean within the same row followed by different superscript are significantly different ; * = significant at P < 0.05; NS = No significant at P<0.05; TWBC = Total White Blood Cell

Table 3: Mean (M) of biochemical parameters at the different of physiological status.

Physiological status	Early stage of pregnancy	Late stage of pregnancy	Parturition	Postpartum period	Non pregnant Non lactating	Standard Error (SE)	Significance Level
Parameters							
Glucose mg/dL	50.95^b	60.76^{ab}	75.37^a	48.29^c	50.61^b	1.00	*
Total protein g/dL	7.50^a	5.09^b	7.04^a	7.76^a	7.92^a	0.15	*
Albumin g/dL	3.90	3.80	3.59	3.97	3.92	0.08	NS
Globulin g/dL	3.61^a	1.29^b	3.45^a	3.61^a	3.99^a	0.15	*
Urea mg/dL	33.43^b	29.91^c	45.76^a	33.33^b	30.89^{cb}	0.62	*
Creatinine mg/dL	0.64^b	2.09^a	0.60^b	0.61^b	0.53^b	0.07	*
ALT IU/L	28.08^b	32.58^{ab}	36.60^a	24.30^c	25.50^c	0.58	*
AST IU/L	82.58^b	87.70^{ab}	95.10^a	77.54^c	80.70^b	1.31	*

a, b ,c within the same row followed by different superscript are significantly different; * = significant at P < 0.05; NS = No significant at P<0.05; ALT = Alanine aminotransferase; AST = Asparatate aminotransferase.

DISCUSSION

Significantly lower (P<0.05) PCV, Hb, TRBC, MCV and MCH in gestation period, except ESR and MCHC were higher. This are probably due to dilution of blood which occur as a consequence of plasma volume increase and prevent a marked decreased in total oxygen caring capacity of circulating blood. These finding are in agreement with the earlier reports (Calvo *et al*., 1989; Azab and Abdel-Maksoud, 1999).

The PCV, TRBC, Hb and MCV subsequently decreased during the day of parturition and postpartum period, may be due to loss of RBC during parturition and which might be attributed to the hemodilution effect resulting from an increase in plasma volume and/or the increasing water mobilization to mammary gland through the vascular system (Elsharif & Assad, 2001; Bamerny, 2013).

The TWBC count and neutrophils were showed significantly lower (P<0.05) in the day of parturition, which might be due to increase of plasma cortical (Vihan & Rai, 1987). Observed no effect of physiological stage on basophils, lymphocyte, eosinophils and monocyte.

Significantly higher (P<0.05) concentration of glucose in the day of parturition, followed by late stages of pregnancy, which might be due to increase of several hormones as cortisol and estrogen (Herd *et al*., 2000), also that the parturition occurred in the winter season these results are in agreement with those obtained by (Alharbi, 2012), who reported the higher values during winter season in comparison to the other period of the year, this may be attributed to seasonal effect with relation to nutritional effect for difference of roughs while grazing during different seasons.

Total proteins showed a decreasing trend in the late stage of pregnancy, may be due to production of globulin rich colostrums (Davson and Segal, 1980) and also due to the preparation of reproductive system during pregnancy (growth of uterus) which requires large quantity of protein during pregnancy (Vihan and Rai, 1983).

The urea showed significantly higher (P<0.05) level during the day of parturition and the lower level during the late stage of pregnancy. This result was in agreement with that found by (Silanikove *et al*., 2000), may be to increased cortisol that increase the catabolism of protein in the body. No variation between the other stages.

The Creatinine showed the higher level during the late stage of pregnancy, and no variation between the other stages this also due to effect of cortisol on body protein.

The present study showed that ALT and AST were affected by the physiological stages. The higher level of ALT and AST were observed in the day of parturition followed by the late stage of pregnancy, the lower level was showed in the postpartum period, this due to effect of glucocorticoid (Allen *et al*., 1977).

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