



BIOCHEMICAL AND MINERAL PROFILE IN NARI SUWARNA EWES DURING LATE PREGNANCY AND EARLY POSTPARTUM PERIOD

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ABSTRACT

The present study was carried out in NARI Suwarna ewes to ascertain the influence of pregnancy and postpartum period on serum mineral and biochemical profile. Thirty NARI Suwarna ewes aged two to three years and maintained at the Department of Veterinary Gynaecology and Obstetrics, Veterinary College, Hebbal, Bengaluru, were selected for the study. Selected animals were divided into five groups, with six animals in each group, viz., group I, II, III, IV and V, based on the presence or absence of pregnancy and also based on the presence of single and multiple foetuses. Blood sample collected from each of study animal were utilized for determination of mineral like serum calcium and phosphorus, various biochemical parameters like blood glucose, serum urea, serum total protein and serum albumin. In the present study, a significant ($P < 0.05$) reduction in the blood glucose levels, serum total protein and calcium concentrations was observed in the pregnant group animals compared to control and postpartum group animals. The serum levels of urea, albumin and phosphorous did not vary ($P > 0.05$) among the different group animals. From the study it was concluded that, the blood glucose and serum levels of calcium and total protein significantly ($P < 0.05$) declined in pregnant NARI Suwarna ewes owing to their supply to the foetal tissues to meet out the increased demand of the growing foetus.

KEY WORDS: NARI Suwarna, Pregnancy, Postpartum, Serum Urea and Glucose.

INTRODUCTION

Current world sheep population is 1610.78 millions and of which approximately 74 millions of sheep are present in India, which make up 6.8% of the total world sheep population (FAOSTAT, 2010). India ranks 3rd in sheep population, next to China and Australia and is placed 7th among the top 10 countries of the world in terms of meat and wool production. Though there are about 60 sheep breeds in India including well recognized, lesser known and some wild species (FAO, 2000), most of the Indian sheep breeds are less prolific in terms of fecundity rate (Rhodes *et al.*, 2003) compared to exotic breeds. In an attempt to evolve high prolific sheep breed suitable for rural Indian conditions, Nimbkar Agricultural Research Institute (NARI), Pune, Maharashtra, India, has developed NARI Suwarna sheep breed. Though this sheep is known for twin pregnancy and mothering ability, the information on serum mineral and biochemical profiles during different physiological status in this breed is lacking. The pregnancy, parturition and early lactation are considered as most critical and stressful periods of dam's life cycle because of high nutritional requirements for fetus, colostrum and milk production (Goff and Horst, 1997, Sobiech *et al.*, 2008). The mineral metabolism, in particular calcium and phosphorus undergoes a substantial change to guarantee the synthesis of colostrum and milk (Yokus *et al.*, 2004). Therefore the present work was carried out to investigate the influence of pregnancy, twin pregnancy, multiple pregnancy and postpartum period on serum mineral and biochemical profile in NARI Suwarna ewes.

MATERIALS & METHODS

For the present study, a total of 30 NARI Suwarna ewes aged two to three years of age maintained under semi-intensive management system at the Department of Veterinary Gynaecology and Obstetrics, Veterinary College, Hebbal, Bengaluru, were utilized. Selected animals were divided into five groups, as group I (nonpregnant), group II (late pregnant ewes with single foetus), group III (late pregnant ewes with multiple foetuses), group IV (early postpartum single lambing ewes) and group V (Early postpartum multiple lambing ewes). Pregnancy and nonpregnancy in study ewes was confirmed by ultrasonography technique based on presence and absence of the foetuses in the uterine lumen. Ultrasound features of embryonic vesicle were utilized to select the ewes with single and multiple foetuses. About 5 ml of blood was collected in clot activator coated vacutainer from each of the study animal and totally four collections were done with an interval of 10 days. Blood samples were collected in group II and III animals, on day 115, 125, 135, 145 of pregnancy and from group IV and V animals on day 5, 15, 25 and 35 of postpartum period. Blood from nonpregnant ewes (control group) was collected along with other group animals with an interval of 10 days during the entire period of the study (75 days). Collected blood was allowed to stand undisturbed for half an hour and then it was subjected to centrifugation at 3000 rpm for 15 minutes to obtain the serum from the blood samples. Separated serum samples were stored at -20°C until it was used for the determination of minerals like serum calcium and phosphorous and various biochemical

parameters like serum urea, serum total protein and serum albumin. At the time of blood collection, a small drop of blood was utilised immediately to estimate blood glucose level using Glucochek[®] glucometer procured from Aspen Diagnostic Pvt. Ltd. India, which is based on GOD-POD method (Glucose oxidase - Peroxidase) (Trinder, 1969). The serum biochemical constituents were determined by using ready to use reagent test kits with the help of STAR 20 semi automatic biochemical analyzer (Rapid Diagnostic Pvt. Ltd., India).

Serum calcium and phosphorus were determined using reagent kits manufactured by Lab-care Diagnostics Pvt. Ltd., India, as per the method of Beeler and Catrou, 1983 (calcium) and Tietz, 1976 (phosphorus). The absorbance of the coloured compound developed in the test was measured at 650 nm and 340 nm, respectively, for calcium and phosphorus.

The commercially available reagent kits manufactured by Transasia Bio- Medicals Ltd., India, were utilized to determine the serum total protein and serum urea concentrations using biuret method and GLDH – Urease methods respectively, as described by Tietz (1976). Serum albumin was determined by BCG (Bromocresol green) dye method as described by Doumas *et al.* (1972) using commercially available reagent kits manufactured by Transasia Bio- Medicals Ltd., India.

The data obtained in the present study were subjected to statistical analysis by using the GraphPad Prism version 5.01 (2007), by applying one-way ANOVA with Tukey’s post test. The values were expressed as mean ± standard error and the level of significance or non-significance was determined at P value of 0.05.

RESULTS & DISCUSSION

The serum concentrations of different minerals and biochemical parameters are depicted in the table 1.

The present study showed significant (P<0.05) variation in the mean blood glucose and serum total protein concentrations in different groups. The pregnant group (group II and III) animals showed significantly (P<0.05) lower blood glucose and serum total protein concentrations compared to postpartum group (group IV and V) and control group (I) animals. Further, there was a no significant difference (P>0.05) in blood glucose and serum total protein concentrations between control group and postpartum group animals. The decrease in glucose levels in pregnant group in the present study was in agreement with the findings of Takarkhede *et al.* (1999) and Teleb *et al.* (2014) who observed significantly lower blood glucose in pregnant compared to postpartum and nonpregnant Malpura ewes and Saidi ewes, respectively. Balikci *et al.* (2007) and Hafez *et al.* (2010) reported significantly lower serum glucose levels during late pregnancy compared to early postpartum stage in single and twin foetus bearing Akkaraman ewes and Ossimi ewes, respectively. This decrement in blood glucose in the pregnant group animals observed in the present study could be attributed to foetal development and mobilization of maternal glucose to foetal tissues.

Significantly lower serum total protein levels in pregnant group animals observed that study was in agreement with Iriadam (2007) and Soliman (2014) who showed significant decrease in serum total protein during late pregnancy compared to early postpartum Kilis does and Ossimi ewes, respectively. Balikci *et al.* (2007) recorded significantly lower serum total protein during late gestation period in both single and twin bearing Akkaraman ewes. The reduced serum total protein during late pregnancy observed in the present study could be ascribed to the utilization of maternal amino acids for the synthesis of foetal proteins to support the foetal growth.

TABLE 1. Serum mineral and biochemical profile (Mean ± SE) in NARI Suwarna ewes during different physiological status (n = 6)

Sl. No.	Parameters	Group I	Group II	Group III	Group IV	Group V
1	Blood Glucose (mg/dL)	53.10 ± 1.52 ^b	47.29 ± 1.39 ^a	47.00 ± 0.97 ^a	52.50 ± 0.79 ^b	53.63 ± 0.80 ^b
2	Serum Total Protein (g/dL)	6.83 ± 0.36 ^{ac}	6.11 ± 0.35 ^a	6.17 ± 0.30 ^a	7.74 ± 0.40 ^{bc}	7.83 ± 0.44 ^{bc}
3	Serum Albumin (g/dL)	3.24 ± 0.11	3.19 ± 0.18	3.02 ± 0.19	3.54 ± 0.23	3.24 ± 0.08
4	Serum Urea (mg/dL)	43.71 ± 0.85	42.32 ± 0.45	43.06 ± 1.07	42.17 ± 0.78	41.94 ± 1.40
5	Serum Calcium (mg/dL)	10.93 ± 0.31 ^b	9.41 ± 0.12 ^a	8.37 ± 0.24 ^a	11.04 ± 0.36 ^b	11.59 ± 0.14 ^b
6	Serum Phosphorus (mg/dL)	5.44 ± 0.38	5.69 ± 0.26	5.64 ± 0.45	5.99 ± 0.48	5.53 ± 0.36

Note: Mean ± SE values within the row with different superscripts differ significantly (P<0.05).

Significant reduction in the serum calcium levels in pregnant group compared to control and postpartum group ewes observed in the present study were in accordance with the findings of Teleb *et al.* (2014) in Saidi ewes. Azab and Maksoud (1999), Iriadam (2007) and Bamerny (2013) observed significant reduction in serum calcium levels during late pregnancy compared to nonpregnant period in Baladi does, Kilis does and Meriz does, respectively. Serum calcium levels were significantly lower at pre-partum period compared to early postpartum period in Awassi ewes (Gurgoze *et al.* 2009). Significantly lower levels of serum calcium during late pregnancy observed in the present study could be attributed to the

increased demand for the mineralization of foetal skeleton and movement of calcium out of blood plasma that is not balanced by increase in the rate of absorption of calcium from the gut or bone (Elnageeb and Adelatif, 2010).

In the present study, the serum concentrations of albumin, urea and phosphorus did not show any significant (P>0.05) difference during different physiological status. However, the serum concentration of calcium was significantly (P<0.05) lower in pregnant group animals compared to control and postpartum group animals. And the serum calcium concentrations in control and postpartum group animals did not vary significantly (P>0.05).

These nonsignificant variations in serum albumin, urea and phosphorous levels observed in the current study are in agreement with Teleb *et al.* (2014) who also reported nonsignificant difference in serum albumin, urea and phosphorous levels in nonpregnant, late pregnancy and early postpartum period in Saidi ewes.

From the present study it was concluded that the physiological stages like pregnancy and postpartum influence the mineral and biochemical profile in NARI Suwarna ewes. The blood glucose, serum calcium and total protein levels significantly reduced during pregnancy compared to nonpregnancy and postpartum stages and further, their levels did not vary significantly between nonpregnant and postpartum ewes.

REFERENCES

- Azab, M.E. and Maksoud, H.A.A. (1999) Changes in some hematological and biochemical parameters during prepartum and postpartum periods in female Baladi goats. *Small Ruminant Res.* 34, 77-85
- Balikci, E., Yildiz, A. and Gurdogan, F. (2007) Blood metabolic concentrations during pregnancy and postpartum in Akkaraman ewes. *Small Ruminant Res.* 67, 247-251.
- Bamerny, A.O. (2013) Changes in some haemato biochemical and electrolytes parameters in female Meriz goats during pregnancy and after parturition. *J. Anim. Sci.* 2(1):11-14.
- Beeler, M.F. and Catrou, P.G. (1983) Disorders of calcium metabolism *In: Interpretation in Clinical Chemistry.* ACSP Press, Chicago.
- Doumas, B.T., Arends, R.L. and Pinto, P.C. (1972) Standard methods of clinical chemistry. Academic Press Chicago, Denmark. 7, 175-189.
- Elnageeb, M.E. and Adelatif, A.M (2010) The minerals profile in desert ewes (*Ovis aries*): Effects of pregnancy, lactation and dietary supplementation. *American – Euroasian J. Agric. Environ. Sci.* 7(1),18-30
- FAO (2000) World Watch List for domestic animal diversity, 3rd edn. Information Division, FAO, Rome.
- FAOSTAT (2010) FAOSTAT Agriculture Data. Food and Agriculture Organization Statistics, Rome, Italy.
- Goff, J.P. and Horst, R.L. (1997) Physiological changes at parturition and their relationship to metabolic disorders. *J. Dairy Sci.* 80, 1260-1268.
- Gurgoze, S.Y., Zonturlu, A.K., Ozyurtlu, N. and Icen, H. (2009) Investigation of some biochemical parameters and mineral substance during pregnancy and postpartum period in Awassi Ewes. *Kafkas. Univ. Vet. Fak. Derg.* 15(6), 957-963.
- Hafez, A.E.F., Mahfouz, M.K. and Maksoud, H.A.A. (2010) Biochemical changes in glutathione redox system and glucose regulation in late pregnant Ossimi ewes. *J. Anim. Sci.* 6(11), 742- 748.
- Iriadam M (2007) Variation in certain hematological and biochemical parameters during the peripartum period in Kilis does. *Small Ruminant Res.* 73, 54–57.
- Rhodes, F.M., Mcdougall, S., Burke, C.R., Verkerk, G.A. and Macmillan, K. L. (2003) Invited Review: Treatment of cows with an extended postpartum anestrous interval. *J. Dairy Sci.* 86, 1876-1894.
- Sobiech, P., Milewski, S. and Zdunczyk, S. (2008) Yield and composition of milk and blood biochemical components of ewes nursing a single lamb or twins. *Bull Vet Inst. Pulawy.* 52, 591-596.
- Soliman, E.B. (2014) Effect of Physiological status on some haematological and biochemical parameters of Ossimi sheep. *Egyptian J. Sheep Goat Sci.* 9(2), 33-42.
- Takarkhede, R.C., Gondane, V.D., Kolte, A.Y. and Rekhate, D.H. (1999) Biochemical profile during different phases of reproduction in ewes in comparison to rams. *Indian Vet. J.* 76, 205-207.
- Teleb, D.F., Ahmed, N.A.H., Tag El-Din, H.A., Abou El Soud, S.M. and Hassan, O.M. (2014) Study on levels of some blood hormonal and biochemical constituents during different reproductive status in Saidi ewes. *Egyptian J Sheep and Goat Sci.* 9(3), 105-113.
- Tietz, N.W. (1976) *Fundamentals of Clinical Chemistry.* 2nd Edn., W. B. Saunders., Philadelphia, U.S.A.
- Trinder, P. (1969) Determination of glucose in blood using glucose oxidase with an alternative oxygen acceptor. *Ann. Clin. Biochem.* 6, 24-33
- Yokus, B., Cakmr, D.U. and Kurt, D. (2004) Effects of seasonal and physiological variations in sheep. *Biol. Trace Elem Res.* 101, 241-255.