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Blood Profile of Vitamin A and β-Carotene During Post-Partum Period in Surti Goats

Tanvi D. Manat, Sandhya S. Chaudhary* ,Virendra Kumar Singh and Sanjay B. Patel

Department of Veterinary Physiology & Biochemistry

Vanbandhu College of Veterinary Science and Animal Husbandry,

Navsari Agricultural University, Navsari-396450

Corresponding Author: : sandhyachaudhary6@gmail.com

Abstract

The present study was undertaken to study levels of vitamin A and β-carotene in blood of post-partum Surti goats. 40 Surti goats were selected comprising of 20 goats with recent parturition (treatment group) and 20 non-pregnant animals (control group). Blood collection was done on 0, 7, 14, 21, 30 and 45 day post-kidding (treatment group) and once from control group and analyzed for Vitamin A and β-carotene. Both the analytes were significantly low on 0 day. Significant difference ($P<0.05$) in vitamin A as well as β-carotene ($P<0.01$) was observed between 0 and 21st day post-partum followed by non-significant difference in vitamin A after 21 days. However, β-carotene values at 21st day significantly differed from those at 30th and 45th day. Non–significant difference between control and treatment group from 7th day onwards was observed in vitamin A. β-carotene values of treatment group were significantly lower at 0 and 21st day postpartum as compared to control. It was concluded that on the day of kidding there is decrease in circulatory levels of vitamin A and β-carotene and this decrease can be used as an indicator of stress.

Keywords: Postpartum period, Surti goat, vitamin A, β-carotene

Introduction

Goats are integral components of farming system and primary source of livelihood of poor farmers. Gujarat has 5 goat breeds out of which Surti goat, a dual purpose breed, with good production and reproduction potential is facing the problem of extinction and therefore efforts are needed for its conservation. Scanty study and information is available for Surti goats, especially during stressful transition periods involving post-partum and lactation during which losses of vitamin A becomes critical.

Vitamin A is an essential fat-soluble vitamin involved in critical biological functions. Because most mammals cannot carry out its de novo synthesis, vitamin A must be provided in the diet as retinol or as provitamin A, which may, after cleavage, yield retinal, and then retinol. Vitamin A possess antioxidant activity and thus protects cells by counter-acting free radical damage (Ross, 1999) which otherwise can contribute to certain chronic diseases and regulates immune function of animals by protection of mucosal epithelium acting as the first defense barrier.

β-carotene, a vitamin A precursor, converted mostly by the mucosa of the small intestine appears to be an efficient provitamin (Harrison, 2012)). β-carotene can serve as an antioxidant against lipid peroxidation thereby protecting the uterine and ovarian steroidogenic cells from oxidative damage. β-carotene and vitamin A, have antioxidant activity by quenching free radicals normally produced during cell metabolism (Sen *et al.*, 2010).

Fluctuations in the plasma levels of vitamin A and β carotene during pregnancy , post partum and early lactation was reported by Chawla and Kaur (2004) and decreased plasma Vitamin A during last month of pregnancy and increased level of β-carotene has been reported by Yildiz *et al.* (2005). Considering the importance of antioxidant properties of β-carotene and vitamin A and need for related studies, present study was undertaken with the objective to investigate changes in vitamin A and β-carotene in blood of post-partum Surti goats.

Materials and Methods

The present study was conducted in the Department of Veterinary Physiology and Biochemistry. The animals under experiment were selected and maintained at Livestock Research Station, Navsari Agricultural University, Navsari. Total 40 Surti goats (36 to 51 month of age) with first to sixth parity were selected out of which 20 goats who had undergone recent parturition acted as treatment group and 20 non-pregnant goats comprised control group. Approximately 5 ml blood samples were collected in heparinized vacutainers from treatment group on 0, 7, 14, 21, 30 and 45 day post-kidding and once from control group and analyzed for Vitamin A and β-carotene. Plasma was harvested from heparinized blood and used for further analysis. Vitamin A and β-carotene were analyzed using modified method of Tiews and Zentz (1966). The data obtained after laboratory analysis were analyzed using Randomized Block Design.

Results and Discussion

The levels of vitamin A and β-carotene during post partum are presented in Table-1. The values of Vitamin A (µg/ml) on 0, 7th, 14th, 21st, 30th and 45th day post kidding were 0.05±0.01 , 0.17±0.02, 0.11±0.02, 0.14±0.03, 0.16±0.02 and 0.18±0.05 respectively and in control was 0.15±0.04. The values of β-carotene (µg/ml)on 0, 7th, 14th, 21st, 30th and 45th day post kidding were 1.05±0.12, 1.66±0.28, 1.76±0.26, 1.96±0.25, 3.16±0.25 and 3.28±0.61 respectively and in control was 3.10±0.20. Vitamin A is necessary for normal, reproduction and health. β-carotene is a precursor of vitamin A. Periparturient cows undergo intense mammary growth and marked production of colostrum rich in vitamin A and β-carotene during gestation, therefore its circulatory levels decrease at the time of parturition. Further, concentration of vitamin represents the nutritional status of the animals.

Table 1: Blood levels of Vitamin A and β-carotene (Mean±SE) in post-partum Surti Goats

Parameters	0 day	7 day	14 day	21 day	30 day	45 day	Control
Vitamin A (µg/ml)	0.05±0.01^{a}	0.17±0.02^{b}	0.11±0.02^{ab}	0.14±0.03^{b}	0.16±0.02^{b}	0.18±0.05^{b}	0.15±0.04^{b}
β-carotene (µg/ml)	1.05±0.12^{a}	1.66±0.28^{ab}	1.76±0.26^{ab}	1.96±0.25^{b}	3.16±0.25^{c}	3.28±0.61^{c}	3.10±0.20^{ab}

Mean bearing different superscript differ significantly at P<0.01 (vitamin A) and P<0.05 (β-carotene)

Vitamin A and β-carotene were significantly low on 0 day owing to increased mammary growth and colostrum production. A significant difference (P<0.05) in vitamin A as well as β-carotene (P<0.01) was observed between 0 and 21st day post-partum followed by non-significant difference in vitamin A after 21 days. However, β-carotene values at 21st day significantly differed from those at 30th and 45th day. Non–significant difference between control and treatment group from 7th day onward was

observed in vitamin A. β-carotene values of treatment group were significantly lower at 0 and 21st day postpartum as compared to control.

The levels of vitamin A reported in the present study during post partum were lower than that reported by Afshari *et al*. (2008) in sheep. The difference may be due to the physiological status and species. In the present study significantly lower level of vitamin A and β-carotene was observed on 0 day. A significantly lower level of β-carotene on the day of kidding has been observed by Yildiz et *al*. (2005) in cow.

Thus it was concluded from the present study that on the day of kidding there is decrease in circulatory levels of vitamin A and β-carotene and this decrease can be used as an indicator of stress.

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Conflict of Interest: All authors declare no conflict of interest.

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