

SERUM THYROID HORMONE LEVELS DURING PERIPARTUM PERIOD IN OSMANABADI GOAT

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ABSTRACT

Blood samples from eight Osmanabadi goats in their advance stage of pregnancy, aged between four to eight years were collected twice weekly and triiodothyronine (T_3) and thyroxine (T_4) were measured. The T_3 concentration was ranged from 0.72 ± 0.03 to 1.13 ± 0.07 ng/ml during prepartum period and 1.02 ± 0.07 to 1.05 ± 0.07 ng/ml during postpartum period. The T_4 levels ranged from 53.44 ± 5.4 to 69.98 ± 2.84 ng/ml during prepartum period and 61.40 ± 4.50 to 79.30 ± 3.80 ng/ml during postpartum period. Serum triiodothyronine (T_3) was positively correlated with respiration rate, rectal temperature and fecundity rate. Triiodothyronine has shown significant positive correlation with pulse rate and rectal temperature while other relationships were statistically non-significant.

KEYWORDS: Triiodothyronine (T_3); Thyroxine (T_4); Osmanabadigoat; Peripartum

INTRODUCTION

India possesses 125.7 millions of goat. Goat has distinct social, economical, managerial and biological advantages over other livestock species. Osmanabadi goat has a very efficient reproductive performance and resistance against diseases. Thyroid hormone plays an important role in the growth, metabolism, differentiation, reproduction and lactation (Turner, 1966). Thyroid hormones are important regulators of mammalian development, cellular proliferation and metabolism. Infertility, irregular oestrous cycle, reduced libido and decreased sperm production are reproductive irregularities associated with thyroid hormone insufficiency. Some workers tried to correlate the thyroid hormones with pregnancy, stage of lactation, fecundity rate and growth of the fetus (Salah, 1996) but the information regarding this aspect in Osmanabadi goat is scanty.

MATERIALS AND METHODS

The study was conducted in 8 apparently healthy Osmanabadi goats aged between four to eight years. The goats were in their advance stage of pregnancy. Blood samples were collected twice weekly day starting from 15 day prepartum, on the day of kidding and twice weekly up to 15 day postpartum. Physiological responses of the goats were recorded prior to blood collection. To measure the circulating levels of T_3 and T_4 radioimmunoassay was conducted. Analysis of variance of data was done using Completely Randomized Design (CRD). Difference in mean was tested using critical difference (CD) test (Snedecor and Cochran, 1994).

RESULTS & DISCUSSION

Triiodothyronine (T_3)

The mean \pm S.E. serum levels of triiodothyronine during peripartum period in Osmanabadi goat is depicted in Table 1. The T_3 concentration was ranged from 0.72 ± 0.03 to 1.13 ± 0.07 ng/ml during prepartum period and 1.02 ± 0.07 to 1.05 ± 0.07 ng/ml during postpartum period of Osmanabadi goats. The lowest value of 0.72 ± 0.13 ng/ml was recorded on the day of kidding. There was significant decrease ($P < 0.01$) in the levels of T_3 from day 15 antepartum to the day 0 i.e. the day

of kidding. The levels of T_3 significantly ($P < 0.01$) increased immediately on next day of kidding. But values remained almost similar from day 4 onwards to 15th day of parturition without any significant change. The level of T_3 recorded in our studies was slightly lower than the value recorded by Patel *et al.* (1993) in Surti and Marwari goats. Klein *et al.* (1978) reported increased in triiodothyronine concentration 4-6 days before spontaneous vaginal delivery in sheep.

Table 1. Mean \pm S.E serum tri-iodothyronine, thyroxine and T4:T3 ratio during peripartum period in Osmanabadi goats

Peripartum Days	Tri-iodothyronine (ng/ml)	Thyroxine (ng/ml)	T4:T3 Ratio
-15	1.13 ^a \pm 0.07	68.93 ^b \pm 4.86	62.45 ^a \pm 8.86
-11	0.75 ^b \pm 0.06	66.12 ^{bc} \pm 3.86	91.64 ^c \pm 6.78
-7	0.81 ^b \pm 0.03	67.55 ^b \pm 3.69	84.05 ^b \pm 5.09
-4	0.79 ^b \pm 0.04	69.98 ^b \pm 2.84	89.96 ^{ab} \pm 7.77
0	0.72 ^b \pm 0.03	53.44 ^a \pm 5.42	69.96 ^{ab} \pm 7.14
4	1.03 ^a \pm 0.08	61.40 ^{ab} \pm 4.50	60.93 ^a \pm 4.70
8	1.05 ^a \pm 0.09	63.91 ^{ab} \pm 5.18	62.26 ^a \pm 6.24
12	1.05 ^a \pm 0.07	76.50 ^c \pm 5.13	74.75 ^{abc} \pm 5.96
15	1.02 ^a \pm 0.07	79.30 ^d \pm 3.80	79.26 ^{abc} \pm 4.72

Table 1. Mean \pm S.E serum tri-iodothyronine, thyroxine and T4:T3 ratio during peripartum period in Osmanabadi goats

Thyroxine (T_4)

The mean \pm S.E. serum levels of thyroxine (T_4) during peripartum period in Osmanabadi goat is depicted in Table 1. The levels ranged from 53.44 \pm 5.4 to 69.98 \pm 2.84 ng/ml during prepartum period and 61.40 \pm 4.50 to 79.30 \pm 3.80 ng/ml during postpartum period in Osmanabadi goats. The lowest value of 53.44 \pm 5.42 ng/ml was obtained on day of kidding (day 0) and the highest value of 79.30 \pm 3.80 ng/ml on 15th day postpartum. The levels of T_4 showed non significant decreasing trend towards approaching kidding. There is significant ($P < 0.05$) decrease in the level of T_4 on the day of kidding. Thereafter the levels showed increasing trend and significantly ($P < 0.05$) high levels obtained on day 12 and day 15th of postpartum.

The levels of T_4 recorded in our study were slightly lower than the value recorded by Patel *et al* (1993) in Surti and Marwari goats. Whereas the levels were higher than the values recorded by Suganya and Gomathy (2009) in Tellichery goats. Thyroxine levels showed increasing trend after parturition and significant high levels ($P < 0.01$) obtained on day 12 and 15 postpartum. These

findings are in agreement with Riss and Madson (1985) in goats and Salah (1996) in Ardi goats.

T₄ : T₃ ratio

The T₄ : T₃ ratio in the present study did not show any definite trend during the peripartum period (Table 1). The ratio declined on the day of kidding to 69.96 ± 7.14. During postpartum period the T₄ : T₃ ratio showed increasing trend and significant increase in the T₄ : T₃ ratio was observed (P<0.01) on day 12 and 15 postpartum. The literature regarding the pattern of T₄ : T₃ ratio during the peripartum period in goats could not be traced for comparison. The value of serum T₄ : T₃ ratio recorded in the present study were higher than those reported by Dalvi *et al.*(1995) in crossbred cows. Agrawal *et al.* (1989) reported non-significant variations in serum T₄ : T₃ ratio during peripartum period in camel.

Physiological Responses

Although the considerable variations observed in rectal temperature, pulse rate and respiration rate between the individual animals during the period of experiment no definite pattern could be observed and the value did not differ significantly.

Table 2. Correlation coefficient of serum triiodothyronine, thyroxine and respiratory rate, pulse rate, rectal temperature, birth weight of kids and fecundity rate in Osmanabadi goat.

Parameter	T3(ng/ml)	T4(ng/ml)
Respiratory rate (Breaths/min)	0.03NS	0.09NS
Pulse rate (counts/min)	0.77S	0.77S
Rectal Temperature (oF)	0.66S	0.40NS
Birth weight of kid (Kg)	-0.417NS	-0.410NS
Fecundity rate	0.379NS	0.402NS

S=Significant;NS = Non significant

Values more than 0.549 are significant at 1% level

Values in between 0.418 to 0.549 are significant at 5% level

Relationship of thyroid hormones with physiological responses, body weight of kid and fecundity rate:

The correlation of T₃ and T₄ with the physiological responses such as the rectal temperature, pulse rate, respiration rate and also with birth weight of kids and fecundity rate depicted in (Table 2) , revealed that Triiodothyronine has significant (P<0.01) positive correlation with pulse rate and rectal temperature while other relationship were statistically non-significant. The positive significant correlation of T₃ with pulse rate as observed in the present study might be due to marked increase in metabolic rate during peripartum period. Kings (1983) suggested that pulse rate is a approximate index of total metabolism and increased in pulse rate is related to rise in total metabolism.

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