A NOTE ON THYROID HORMONAL PROFILE AND CHOLESTEROL DURING AGEING IN MAGRA SHEEP*

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ABSTRACT

The present investigation was undertaken with the objective of correlating peripheral concentration of Thyroxine (T4) and Triiodothyronine (T3) hormone with age and sex in Magra sheep. Also, the study was aimed to correlate the peripheral concentration of thyroid hormones with serum cholesterol during ageing. The T4 concentration decreased with the advancing age. No definite pattern was noticed in the changes of T3 level as the age advanced. Female animal had significantly (P<0.01) higher total T4 levels as compared to males whereas no sexual dimorphism was observed in T3 levels. Serum cholesterol concentration increased with the advancement of age.

The main hormones secreted by the thyroid glands are Thyroxine (T4) and Triiodothyronine (T3). These hormones have a versatile role in regulation of tissue differentiation, basal metabolic rate, growth, reproduction and lactation. Thyroid hormones stimulate the basic metabolic rate via the metabolism of carbohydrates, lipids and proteins. The actions are mediated by increasing the activities of specific enzymes that contribute to oxygen consumption. The secretion of thyroid hormones by the gland and thyroid hormone utilization by the target cells are controlled by the free fractions and not by the protein bound portions (Dickson, 1977). Among the non-gonadal endocrine organs, thyroid is one which influences both reproductive and productive performance of domestic animals. Cholesterol is the precursor of steroids which includes the bile acids, adrenal cortical hormones and sex hormones. Cholesterol synthesis and storage is essential for steroidogenesis (Dickson, 1977). The role of these hormones and cholesterol in Magra sheep is relatively poorly studied. In the present study, a systemic approach was aimed to evaluate the thyroid hormones level in Magra sheep during their growth period.

Thirty sheep of various age groups (Table 1) and either sex (10 in each age group having 5 male and 5 female), maintained at registered sheep flock of network project of ICAR (Bikaner District of Rajasthan) were included for study. Duplicate samples (blood) from each animal were taken that did not show difference of more than 5%. Analyses of total T4 and total T3 was carried out by solid phase Radioimmuno Assay (RIA) using COAT-A-COUNT kit supplied by DEPU Tianijin China. Serum cholesterol was estimated by Wybenga and Pellegi method as described in diagnostic reagent kit manufactured by Biolab diagnostic. The data were analyzed statistically using least square difference method.

A highly significant (P<0.01) effect of age was observed on serum thyroxine levels (Table 1). The higher concentration of thyroxine observed in younger animals in the present study confirms the earlier finding of higher circulatory levels of thyroxine in sheep (Nathanielsz, 1969). The declining trend in peripheral concentration of T4 with advancing age is similar to the results of Eswari et al. (1999). Higher thyroidal secretion rate in new born animals supports the new born animals to adapt the new extra uterine environment (Andersen et al. 1977). This higher thyroxine concentration in newborn lambs which is elicited in response to TSH, stimulates oxidation and metabolic rate in many cells and may serve as a defensive mechanism by the lambs after birth (Dickson 1977). A reduced metabolic clearance rate could provide another

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possible explanation for elevated thyroxine concentration in animals during early life (Khurana and Madan, 1984).

A highly significant (P<0.01) effect of sex was observed on mean serum thyroxine concentration (Table 1). Females had significantly higher values than male animals. This finding is in accordance with the findings of Prasad, (1990) and Eswari et al. (1999). However, Holcombe et al. (1995) reported that sex had no effect on thyroxine concentration in sheep and Reklewska, (1975) observed that in early life to 6 months of age, thyroxine was higher in female than in male lambs.

There was no significant difference in T₃ level between age groups. Moreover, no definite pattern was noticed in the changes of T₃ level as the age advanced (Table 1). Similar findings were reported by Gupta et al. (1998) in Black Bengal kids, who failed to establish any variations in the level of T₃ with age. However, Eswari et al. (1999) reported that the T₃ levels from 3rd month onward did not show any significant changes. The higher, although non-significant concentration of T₃ observed in new born lambs could be one of the adaptive mechanisms to overcome the stressful period by enhancing the basal metabolism.

No effect of sex was observed in serum T₃ level. However, Griffin et al., (1962) found a highly significant difference between sexes in Hempshire and Shrampshire sheep. Prasad (1990) reported higher levels of T₃ in female lambs during growth. Eswari et al. (1999) reported that T₃ values for females were significantly higher than in males (P<0.05).

Serum cholesterol concentration increased significantly with advancing age (Table 1). An inverse relationship is recorded between serum cholesterol concentration and the circulatory levels of thyroid hormones (Table 1). Similar findings were observed by Naqvi et al. (1991) where hyperthyroidism resulted in hypocholesterolemia and high levels of serum cholesterol were observed in the hypothyroid animals. Thus the higher levels of serum cholesterol recorded in Magra sheep with advancing age could be ascribed to lower level of circulatory thyroid hormones.

Thus, it was concluded that the higher levels of serum cholesterol recorded in Magra sheep with advancing age could be ascribed to lower levels of circulating thyroid hormones and that the thyroid has the cardinal role in attaining the normal adult form.

**Table 1.** Mean ± SE values of serum Thyroxine (T₄), serum Triiodothyronine (T₃) and serum cholesterol in sheep within different age groups and sex.

<table>
<thead>
<tr>
<th>Main effect</th>
<th>Groups</th>
<th>Number of observations</th>
<th>T₄ (ug/dl)</th>
<th>T₃ (ng/dl)</th>
<th>Cholesterol mmol/l</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0-1 year</td>
<td>20</td>
<td>4.340±0.13ª</td>
<td>114.300±8.13</td>
<td>1.119±0.10ª</td>
</tr>
<tr>
<td></td>
<td>1-2 year</td>
<td>20</td>
<td>3.830±0.22ª</td>
<td>109.400±6.57</td>
<td>1.585±0.07ª</td>
</tr>
<tr>
<td></td>
<td>&gt; 2 year</td>
<td>20</td>
<td>3.230±0.19ª</td>
<td>111.900±3.97</td>
<td>2.283±0.08ª</td>
</tr>
<tr>
<td>Sex</td>
<td>Male</td>
<td>30</td>
<td>3.506±0.17ª</td>
<td>110.333±5.07</td>
<td>1.662±0.11</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>30</td>
<td>4.093±0.15ª</td>
<td>113.400±5.39</td>
<td>1.662±0.11</td>
</tr>
<tr>
<td>Overall Mean</td>
<td>60</td>
<td>3.800±0.12</td>
<td>111.866±3.67</td>
<td>1.662±0.08</td>
<td></td>
</tr>
</tbody>
</table>

Mean comparisons have been made within main effects. Mean super scribed by different letters differ significantly (P<0.05) from each other.

REFERENCES