Thyroid hormones and lipid profile in Labrador Retriever male dogs

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ABSTRACT

A study was conducted to assess the thyroid hormones and lipid profile in Labrador Retriever male dogs presented to the Veterinary College Hospital, Bengaluru for routine health check up and vaccination. Based on their age, they were randomly divided into Group I, Group II and Group III that consisted of one to three years age (young age), more than three years to six years age (middle age) and more than six to nine years age (old age), respectively. In all the dogs the body weight was recorded. The profile of thyroid hormones such as thyroid stimulating hormone (TSH), triiodothyronine (T3) and Thryoxine (T4) were estimated by using ELISA kits. The lipid profile parameters such as triglycerides, cholesterol and HDL cholesterol were estimated by using biochemical reagent kits. The values of LDL and VLDL cholesterol were calculated by using Friedewald formula. Further, the blood glucose level was estimated using the Glucochek® glucometer and serum total protein level by using reagent kit. Results revealed that the increased body weight was observed as age advanced. The T3 levels did not vary significantly among different age groups. Whereas, in the advanced age groups there was reduction in T4 levels and increase in TSH levels which was suggestive of hypothyroidism. Triglycerides, cholesterol, LDL and VLDL levels were significantly higher in older dogs followed by middle age group compared to young age group. However, the alterations in blood glucose and serum total protein levels were non significant between different age groups. It was concluded that the Labrador Retriever male dogs could be more prone to hypothyroidism and hyperlipidemia and therefore master health check-up could be taken up at least once in a year as a precautionary measure to avoid complications of hypothyroidism and hyperlipidemia.

Key words: Hyperlipidemia, Hypothyroidism, Labrador Retriever, Male dogs, Thyroid profile.

INTRODUCTION

Dogs are more susceptible to various hormonal disorders. Hypothyroidism is a common endocrine disorder in dogs, whereas, hyperthyroidism is rare in this species (Kaneko et al., 1997). Thyroid hormones are of vital importance in maintaining the initial level of phospholipids in cell membranes and fatty acid composition of the lipids. The alterations in thyroid function result in changes in the composition and transport of lipoproteins (Liberopoulos and Elisaf, 2002). Thyroid dysfunction is more in obese individuals. Thyroid function tests play an important role in clinical diagnosis of altered thyroid status and obesity (Verma et al., 2008).

Similar to other organ systems, the thyroid gland undergoes crucial functional changes with aging. Numerous morphological and physiological changes of the thyroid gland take place during the process of aging. Therefore, subclinical hypothyroidism and hyperthyroidism, as well as thyroid neoplasms which increase with age, require special attention in elderly subjects (Gesing et al., 2012).

Though the information on thyroid profile and lipid profile is available in other breeds of dogs, there is paucity of information in Labrador Retriever dogs. Therefore, the present study was conducted to assess the age differences among various components of thyroid and lipid profiles.

MATERIALSAND METHODS

The randomly selected eighteen healthy Labrador Retriever male dogs presented for routine health check up and vaccination purpose to Veterinary College Hospital, Bengaluru, Karnataka, India, were divided into three groups based on their age with each group comprising of six animals such as Group I : one to three years age (young age), Group II : more than three years to six years age (middle age) and Group III : more than six years to nine years age (old age).

Five ml of blood was collected in the coagulation activated vaccutainer and was allowed to clot for 30 min at
RESULTS AND DISCUSSION

Thyroid hormones: Increased levels of TSH noticed in the old age group (Table 1) could be due to decreased T₄ levels which were in agreement with the opinion of Guyton and Hall (2006). The findings of increased TSH levels in the present study were in concurrence with the earlier workers who opined that the measurement of TSH concentration is a valuable diagnostic tool for the detection of canine hypothyroidism (Mansoor et al., 2011) and TSH levels progressively shift to higher values with age (Gesing et al., 2012).

Significant (P>0.05) variations were not observed in the triiodothyronine levels between different age groups of Labrador Retriever male dogs (Table 1). The findings were in agreement with the report of non significant difference of free T₃ in women by Abraham et al. (2009). Triiodothyronine is the active form of thyroid hormone within the target cell and it acts more quickly and has effects on basal metabolic rate (Kaneko et al., 1997).

Significantly (P<0.05) lower levels of thyroxine was observed in old age group when compared to the middle and young aged dogs. A decreased level of thyroxine was the evidence for hypothyroidism in middle age and the old aged dogs. The age dependent reduction in thyroxine values obtained in the present study was in agreement with the findings of Reimers et al. (1990) in dogs. Maximum occurrence of hypothyroidism was observed in Labrador Retriever dogs (Gulzar et al., 2014).

Lipid Profile: Significant (P<0.05) variation in the body weight was observed in different age groups (Table 2). The increased body weight in proportion to increase in age during the present study was in concurrence with the earlier workers who opined that the increased body weight could be due to decreased thyroxine levels and

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Group I</th>
<th>Group II</th>
<th>Group III</th>
</tr>
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<tbody>
<tr>
<td>Thyroid stimulating hormone (µIU/ml)</td>
<td>0.33 ± 0.03c</td>
<td>0.67 ± 0.04b</td>
<td>1.03 ± 0.10c</td>
</tr>
<tr>
<td>Triiodothyronine (ng/ ml)</td>
<td>1.17 ± 0.17</td>
<td>0.95 ± 0.04</td>
<td>0.88 ± 0.03</td>
</tr>
<tr>
<td>Thyroxine (µg/dl)</td>
<td>0.93 ± 0.06c</td>
<td>0.79 ± 0.08b</td>
<td>0.63 ± 0.09c</td>
</tr>
</tbody>
</table>

Mean ± SE values bearing different superscripts differ significantly in a row at P<0.05.

<table>
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<th>Parameters</th>
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<th>Group III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body weight (kg)</td>
<td>20.92 ± 0.42a</td>
<td>29.59 ± 1.59b</td>
<td>38.18 ± 2.06c</td>
</tr>
<tr>
<td>Triglycerides (mg/dl)</td>
<td>78.69 ± 4.46c</td>
<td>103.67 ± 5.12b</td>
<td>126.27 ± 4.05c</td>
</tr>
<tr>
<td>Total cholesterol (mg/dl)</td>
<td>125.79 ± 5.09c</td>
<td>198.12 ± 6.94b</td>
<td>232.59 ± 19.44c</td>
</tr>
<tr>
<td>HDL cholesterol (mg/dl)</td>
<td>55.78 ± 1.98c</td>
<td>55.32 ± 1.46bc</td>
<td>47.05 ± 1.35c</td>
</tr>
<tr>
<td>LDL cholesterol (mg/dl)</td>
<td>50.91 ± 3.76a</td>
<td>122.1 ± 7.55b</td>
<td>169.2 ± 7.69c</td>
</tr>
<tr>
<td>VLDL cholesterol (mg/dl)</td>
<td>15.73 ± 0.89a</td>
<td>20.73 ± 1.02b</td>
<td>25.25 ± 0.80c</td>
</tr>
<tr>
<td>Blood glucose (mg/dl)</td>
<td>83.13 ± 3.89</td>
<td>94.39 ± 2.31</td>
<td>96.19 ± 5.17</td>
</tr>
<tr>
<td>Total serum protein (mg/dl)</td>
<td>7.10 ± 0.14</td>
<td>7.04 ± 0.27</td>
<td>7.71 ± 0.14</td>
</tr>
</tbody>
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Mean ± SE values bearing different superscripts differ significantly in a row at P<0.05.

There was significant (P<0.05) increase in serum triglycerides levels between three different age groups of dogs. Increased levels of triglycerides in old age dogs could be due to hypothyroidism as it affects lipid metabolism as opined by Jeusette et al. (2004) for dogs and as concluded by Prakash and Lal (2006) for human patients. The findings were also in accordance with Regmi et al. (2010) who found positive correlation between thyroid dysfunction and triglycerides levels in humans and with Usui et al. (2014) who opined as the Labrador Retriever dogs were at greater risk for the high levels of triglycerides.

There was significant (P<0.05) increase in the total cholesterol level between the young aged, middle aged and old aged dogs which could be due to decreased thyroid hormone levels that leads to reduced metabolic rates. The differences of the values of high density lipoprotein cholesterol, being considered as good cholesterol, were non significant (P>0.05) between young and middle aged groups. However, old aged dogs showed significantly (P<0.05) lower levels of HDL cholesterol compared to young and middle aged dogs. The findings were in agreement with the reports of Prakash and Lal (2006) who concluded that the hypothyroidism is associated with the changes in lipid profile.

The values of low density lipoprotein cholesterol increased significantly (P<0.05) as age advanced. Senturk et al. (2002) reported high LDL cholesterol levels in Labrador Retriever dogs compared to Pointer dogs during their determination for the risk of ischemic heart disease. The increased LDL cholesterol levels could be due to the various factors such as age, diet, hypothyroidism, sex and lifestyle of the animals.

There were significantly higher (P<0.05) levels of VLDL cholesterol levels as the age advanced. Barrie et al. (1993) reported that as the age advances the decrease in thyroid hormone levels could lead to reduced concentrations of plasma cholesterol ester transfer to protein concentrations that in turn lead to improper transfer of cholesterol from HDL-C to LDL-C and VLDL-C, that causes improper accumulation of VLDL-C in the old age.

There was no significant (P>0.05) variation in blood glucose levels between the three different age groups of Labrador Retriever dogs. The findings of the present study were in agreement with the observations of Comazzi et al. (2004) in canines and Pattanayak et al. (2014) in dogs. Further, the present study revealed that the total protein content did not vary significantly (P>0.05) between different age groups which were in agreement with the reports of Ariyibi et al. (2002) in Alsatian and local dogs of the tropical climate.

CONCLUSION

Both hypothyroidism and hyperlipidemia were observed in the middle age and old age groups of Labrador Retriever male dogs as compared to young dogs. It was suggested that the annual master health check up could be taken up for early detection of hypothyroidism and hyperlipidemia in Labrador Retriever male dogs that will help to design the managerial practice, dietary and treatment regimen to avoid further complications of hypothyroidism and hyperlipidemia.

REFERENCES


