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EFFECT OF FEED RESTRICTION AND GREEN TEA ON BLOOD PARAMETERS IN RATS WITH HYPERTHYROIDISM OR HYPOTHYROIDISM

Thesis presented by

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ABSTACT

Seventy two Wistar male rats, weighing 250-350 g, were used to evaluate the influence of feed restriction and green tea on the blood parameters in rats with hyperthyroidism or hypothyroidism. For this purpose rats were reared for 6 weeks then divided into 9 groups, the 1st served as control group (C), the 2nd was feed restricted group (F), the 3rd was green tea extract administrated group (G), the 4th was hypothyroid induced group (Ho), the 5th was hypothyroid feed restricted group (HoF), the 6th was hypothyroid green tea extract group (HoG), the 7th was hyperthyroid induced group (Hr), the 8th was hyperthyroid feed restricted group (HrF) and the 9th was hyperthyroid green tea extract group (HrG). Hypothyroidism was induced in rats by administration of 6-n-propyl-2-thiouracil in drinking water to a final concentration of 0·01% for 6 weeks. Hyperthyroidism was induced by administration of thyroxine 200 μg/L in drinking water for 6 weeks. Feed restriction was applied by feeding the rat 60% of the food given to the control group. Green tea was used at a concentration of 0.5% tea aqueous extract in drinking water. GSH, CAT and TAC were decreased in Ho, HoF and Hr groups and were increased, in F and G groups. While, they did not differ than control in HoG, HrF and HrG groups. MDA was increased in Ho, HoF and Hr rats and was decreased, in F and G groups however, it did not differ than control in HoG, HrF and HrG groups. Serum total proteins and globulins concentrations were decreased in Ho and HoF groups and were increased in all hyperthyroid groups. Serum glucose concentration was increased in Hr group and was decreased in F, G, Ho, HoF. Cholesterol and LDL were increased in Ho and HoF groups and they did not differ than control in HoG rats while, they were decreased in the other groups. T_3, T_4 levels were increased in all hyperthyroid groups and decreased in all hypothyroid groups while, they were increased in HoG in comparison with Ho and HoF groups however, they decreased mildly at 6th week in F and G groups. Testosterone level was increased in Hr rats and were decreased in all hypothyroid groups in addition it was decreased in F and G groups while, it did not differ in HrF and HrG rats. sALT, sAST, urea and creatinine were increased in Ho, HoF and Hr groups and they did not differ in HoG, HrF and HrG groups in comparison to control. It is concluded that Co-administration of green tea with hypothyroidism and hyperthyroidism significantly modulate the adverse effects of them by enhancing the antioxidant status of rats. In addition, feed restriction can overcome the deleterious effects of hyperthyroidism while, it don't make significant effect in hypothyroidism in rats.

Key words: antioxidant, hyperthyroidism, hypothyroidism, feed restriction and green tea

اهداء

الي زوجي الحبيب ورفيق طريقي
وابنتي فاطمة وابني عمر ووالداي
الأعزاء وأخواتي

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INTRODUCTION

Thyroid gland holds a critical place in controlling brain and somatic development and metabolic activities ***(Wagner et al., 2008).***Thyroid dysfunctions are considered as one of the most important endocrinopathies in veterinary medicine ***(Rijnberk et al., 2003)***.

Thyroid hormones play a crucial role in the regulation of mitochondrial oxidative metabolism, so high concentrations of thyroid hormones may change the metabolism of oxygen and stimulate the production of free radicals, moreover thyroid hormone has a pro-oxidant effect and increases the oxygen free radical production and hence the resultant decrease in antioxidant state in case of hyperthyroidism, additionally hypothyroidism is characterized by impairments in the redox potential leading to free radical chain reactions and to metabolic suppression of antioxidant capacity ***(Babu et al., 2011).***

In the last decade, it was postulated that many pathogenic processes including neoplastic and mitochondrial diseases, as well as ageing and death of cells may be initiated by free radical species, for this reason, growing attention of researchers has been paid to the group of natural substances, as antioxidants, which are able to protect living organisms from the attack of reactive radical species ***(Babincova´ & Sourivong, 2001).***

Feed restriction may have a greater impact on cell function through activation of redox sensitive transcription factors, which stimulates signaling pathways that change the gene expression profile and cell functioning, it has been proposed that feeding restriction slows the rate of accrual of oxidative damage because mitochondria have a lower rate of superoxide generation ***(Merry, 2004).*** Additionally, Long-term caloric restriction leads to a fall in thyroid hormone levels ***(Rosenbaum et al., 2005).***

Polyphenols found in green tea show 20 times more powerful antioxidant activity than vitamin C, green tea polyphenols (GTP) has a protective effect against a spectrum of oxidants, increases the activity of liver antioxidant enzymes as glutathione peroxidase (GPx) and reduced glutathione (GSH) and improves the total antioxidant activity ***(Pastore and Fratellone, 2006).*** In addition, green tea polyphenols exert their antioxidant effects acting directly as radical scavengers or metal-chelators and indirectly through modulation of transcription factors or enzymes ***(Cabrera et al., 2006).***

This study was therefore conducted to explore whether feed restriction and green tea could overcome the negative effects of hyperthyroidism and hypothyroidism according to their effect on antioxidant parameters, metabolic parameters, hormonal profile, liver and kidney function tests and histopathological picture.