

STUDY OF TOTAL ANTIOXIDANT CAPACITY AND OXIDANT STRESS IN HYPOTHYROID PATIENTS

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Thyroid hormones play an important role in many physiological processes, such as differentiation, growth, development and the physiology of all cells. One of the most studied effects of the thyroid hormone is the control of the basal metabolic rate. Elevation of TSH is the most sensitive indicator of early hypothyroidism. Modifications in its levels can produce several alterations including modifications in the ROS steady-state and the redox environment in the cells. Thyroid hormones are related to the oxidative and antioxidant status of the organism. There is much evidence to show that hypothyroidism is related to oxidative stress and cellular damage. Potentially harmful reactive oxygen species are produced as a normal consequence of normal aerobic metabolism. ROS induce oxidation of proteins and may cause abnormalities in their metabolism. In hypothyroid patients, low level of thyroid hormone may lead to decrease metabolic processes which may either increase or decrease oxidative stress. This study was initiated since information on antioxidant status and oxidant stresses in hypothyroid patients are scanty.

The study involved the estimation of serum total antioxidant capacity (TAC) (n=96), protein thiol concentration (n=90), aryl esterase activity (n=86), total protein concentration (n=88) and albumin concentration (n=88) in hypothyroid patients having TSH level >10 μ IU/L. Hypothyroid patients attending the Nuclear Medicine unit, Faculty of Medicine, University of Peradeniya were identified by elevated serum thyroid stimulating hormone (> 5 IU/ L) by Radio Immuno assay. TAC was measured by using Ferric Reducing Ability of Plasma (FRAP), Protein thiol was measured by DTNB method and Aryl esterase activity was measured by the rate of phenol liberation from phenyl acetate. Total protein was measured by Biuret method and serum albumin by BCG dye binding method. Patients were divided into three groups according to TSH level of 10- 30 μ IU/L, 30.1 - 50 μ IU/L and >50 μ IU/L and according to age as 20 - 40 years, 41- 60 years and 61 - 80 years.

TAC was significantly ($p > 0.05$) higher in patients having TSH level >50 μ IU/L ($931 \pm 237.6 \mu\text{mol/L}$) than in patients having TSH level 10 - 30 μ IU/L ($775.5 \pm 328.6 \mu\text{mol/L}$). This may due to reduced metabolic process observed in hypothyroid patients. The mean protein thiol concentration, aryl esterase activity, total protein concentration and serum albumin concentration in serum of hypothyroid patients were $429.2 \pm 98.1 \mu\text{mol/L}$, $124.5 \pm 47.3 \text{ K unit/L}$, $7.4 \pm 1.1 \text{ g/dl}$, $4.5 \pm 0.6 \text{ g/dl}$. There were no significant differences in protein thiol concentration, Aryl esterase activity, total protein concentration and serum albumin concentration among the patients grouped according to TSH concentration or age.

In hypothyroid patients the metabolic activity is decreased and thus the oxidative stress may be low due to decreased production of ROS. This was evident by the fact that the TAC was significantly higher in hypothyroid patients having TSH > 50 μ IU/. Further prospective studies involving serum thyroid hormone estimation can confirm these suggestions.