Study of Toxic Effects of Iodine & Sodium in Workers of Iodized Salt Factories in Fayoum Governorate, Egypt

Thesis

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By

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Summary and conclusion

Iodine is an essential micronutrient that has a crucial role in metabolism. It is oxidized to produce iodine-containing thyroid hormones. Thyroid hormones are necessary for controlling growth, metabolism, and many other body functions.

Iodine toxicity may lead to thyroiditis, hypothyroidism, hyperthyroidism, and thyroid papillary cancer.

Thyroglobulin (Tg) is a glycoprotein with a molecular weight of approximately 660 kilodalton (kDa), which is synthesized by thyrocytes and released into the lumen of thyroid follicles. Production of Tg is stimulated by TSH, intrathyroidal iodine deficiency or excess, and the presence of thyroid-stimulating immunoglobulins. Tg plays a crucial role in the synthesis of the peripheral thyroid hormones triiodothyronine (T3) and thyroxine (T4), containing tyrosine residues which are iodinated using tyrosine oxidase in monoiodotyrosine and diiodotyrosine forms (MIT and DIT), which then form T3 and T4.

Over the last few decades, the role of Tg as the primary biochemical tumor marker in patients with DTC has been established. Serum Tg measurements, neck ultrasonography, and occasionally diagnostic I-131 whole body scintigraphy are used in the diagnosis and follow up of DTC patients.

Sodium is an essential nutrient involved in the maintenance of normal cellular homeostasis and in the regulation of fluid and electrolyte balance and blood pressure (BP). Its role is crucial for maintaining ECF volume because of its important osmotic action and is equally important for the excitability of muscle and nerve cells and for the transport of nutrients and substrates through plasma membranes.

Hypernatremia is a common electrolyte problem that is defined as a rise in serum sodium concentration to a value exceeding 145 mmol/L.

Hypernatremia results from a net water loss or a sodium gain, and it reflects too little water in relation to total body sodium and potassium. In a simplified view, the serum sodium concentration (Na^+) can be seen as a function of the total exchangeable sodium and potassium in the body and the total body water.

This work was conducted to evaluate toxic effects of iodine and .sodium on workers of iodized salt factories

The current study presents a prospective case-control study carried out in Fayoum governorate and included 120 adult persons grouped into 4 groups (30 persons in each group) as follows:

- **Group 1:** control group include healthy volunteers.
- **Group 2:** workers at iodized salt factories for less than 5 years.
- **Group 3:** workers at iodized salt factories for 5-10 years.
- **Group 4:** workers at iodized salt factories for more than 10 years.

Measurements of blood pressure, serum TSH, FT3, FT4, thyroglobulin, serum sodium, urea, creatinine levels and urine analysis were done.

The results showed that, there was significant difference between studied groups according to serum sodium when compared to the control group.

There was significant difference between studied groups according to SBP and DBP in which mean SBP and DBP of group 4 was significantly higher than other groups.

There was significant relation between serum sodium, work period and blood pressure.

Thyroid hormones (FT3 & FT4) were significantly increased while TSH levels were decreased in iodized salt workers compared to the control group.

There was significant difference between studied groups according to serum Thyroglobulin level, in which mean serum Thyroglobulin of group 4 was significantly higher than other groups.

There was significant relation between thyroglobulin level and age, work period, serum TSH, FT3 and FT4.

In this study we found that, best cut off point of Thyroglobulin for prediction thyroid cancer was 75.2 ng/mL.

Conclusion

The current study concluded that, mean systolic and diastolic blood pressure of iodized salt workers will be affected in the long run and chronic exposure to iodized salt will affect thyroid gland and may increase the risk of thyroid dysfunction and thyroid cancer. Serum Tg may be a useful biomarker in prediction thyroid cancer when a cut-off more than 75.2 ng/ml is used.