BIOCHEMICAL AND CLINICAL CHARACTERIZATION OF IODINE DEFICIENCY DISORDERS IN TAMILNADU

A THESIS TO BE SUBMITTED TO THE TAMILNADU DR. M.G.R MEDICAL UNIVERSITY, CHENNAI

For the degree of **DOCTOR OF PHILOSOPHY** By

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CHAPTER 6
SUMMARY AND CONCLUSIONS:

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Iodine is adequately available in the coastal regions of our country and Tamil Nadu with a large coastal area, the chances of iodine deficiency is much less. There is no iodine deficiency among the in our study patients, and the USI program has also elimin ated the iodine deficiency as reported by many studies.

Three study groups were taken up for the study: Group 1 comprising adult patients referred to the hospital for a thyroid disorder; Group 2 comprised of Paediatric children while group 3 comprised of pregnant women in the 3rd trimester.

We have observed that Iodine excess is the hall mark among all patients in each of the 3 groups.

Study 1 - all the complications known to be associated with excess iodine, viz., goitre (31%), iodine- induced hyperthyroidism or thyrotoxicosis (15%), thyroiditis (39%) and cancer of thyroid (14%) have been observed in this study.

Study 2 - Among the 200 subjects, we found that hypothyroidism was found in 50%. The iodine nutritional status was found to be in excess in 52% which correlates with the hypothyroid status. The main reason for the hypothyroidism appears to be due to autoimmunity which is observed in 68% of the patients.

Study 3 – excess iodine nutritional status was observed in this group of subjects. Majority

of them were in euthyroid state (80%), hypothyroidism was observed in 15 %, while a small number (5%) were hyperthyroid. Autoimmunity was present in 36% of the individuals.

Study 4- This study describes the relationship between the urinary iodin e excretion and thyroid hormone and autoantibodies. We have observed that there is a positive correlation between excretions of urinary iodine and the thyroid hormones and strong positive correlation with anti-microsomal and anti-thyroglobulin autoantibodies. This result suggests that there is a positive association between excessive urinary iodine excretions and the various thyroid disorders like thyroiditis, thyrotoxicosis, goitre and cancer of thyroid.

Study 5- The response of thyroid cell lines to various concentrations of iodine was studied. We observed that the thyroid cell lines had maximal viability at 1 μM of KI. As the concentration of the KI was increased, the viability decreased. This suggests that high concentrations of Iodide are toxic to the cell resulting in cellular malfunctioning and ultimately death. In vivo, the malfunctioning of the thyroid cells due to high iodide concentrations decreases the production and availability of thyroid hormones. This initiates a hyperplasia and causes glandular enlargement- goitre.

The excess iodine is known to trigger auto immunity. Depending on the type of antibodies produced, the patient may present with either hypothyroidism or hyperthyroidism with or without goitre.

Conclusion

In this study we have found that thyroid dysfunction is strongly associated with high iodine nutritional status.

Iodine excess may cause hyperthyroidism, hypothyroidism, euthyroid goitre or thyroid autoimmunity, which is classically seen among our study subjects. These effects are usually not only seen at iodine intakes vastly in excess, but may also occur near the upper recommended limit of 200 μg iodine per day. The iodine-induced disturbances can be easily managed; Iodine induced hyperthyroidism (IIH), in particular, disappears from the population within a few years of properly dosed iodine supplementation. Risk–benefit analysis clearly is in favour of iodine supplementation, but at the same time speaks for a careful dosing, avoiding median intakes above the upper recommended level.

Therefore, continued supplementation of edible salt fortified with iodine should be monitored carefully, and supplementation programs should be tailored to the particular region. Chronic exposure to excess iodine, which may ultimately create a generation of thyroid cripples in South India, should be prevented by careful monitoring and regular follow-up of iodine supplementation. Non-iodised salt should also be available in the market so that patients with thyroiditis, thyrotoxicosis and cancer of thyroid can be treated effectively.

SCOPE FOR FURTHER STUDY

1. Population based study targeting larger numbers of each group of patients taken up in this study.
2. Thyroid cell line culture experiments – detailed histopathological and morphological assessments of the changes observed in cell lines exposed to various concentration of iodine
3. Molecular studies on the thyroid tissue (FNAC) obtained from patients for mutations in goitre and malignancy.

Limitations of the study

- This study was conducted in a tertiary care centre where patients with thyroid disorders are referred from various places in and around Tamilnadu.

- The patients presented to this hospital most often in full form of disease process and hence they have to be effectively managed by either medical or surgical treatment.

- A population level study would have thrown more light on the presentation of the varying stages of the disorders in consideration.

- The dietary and socio-cultural practises of the patients and their families could not be studied in hospital settings

- The Iodine status of the populations with respect to the dietary habits could not be identified. It is not clear whether the excess Iodine observed in all our patients is due to malfunctioning of the thyroid gland or due to excess intake per se.

- We presume that the excess iodine associated with the various thyroid disorders is due to excess intake of Iodine by way of supplementation.
- In the experiment on thyroid cell line, it was not possible to study the morphological changes in the cell that may occur due to exposure to different concentrations of iodine due to limited time factor.