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Study of Ischemia Modified Albumin Levels in Hypothyroid Subjects

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ABSTRACT: Introduction: Hypothyroidism is due to decreased circulating levels of Thyroid hormones and is caused by inadequate functioning of thyroid gland. Ischemia-modified albumin (IMA) is a new biomarker that measures ischemia. The aim of this study was to evaluate IMA levels as a new parameter related to oxidative stress in patients with hypothyroidism. **Methodology:** The present study was conducted on 80 newly diagnosed hypothyroid subjects attending the Medical OPD and Immunoassay Laboratory of the Department of Biochemistry, S.P. Medical College & Hospitals, Bikaner . The results of patients were compared with 80 healthy controls of either sex of similar age group.The blood samples were collected from all the subjects and analyzed for serum thyroid profile and IMA. **Results:** The mean serum IMA level was observed statistically highly significant ($p<0.0001$) in hypothyroid patients as compared with healthy control subjects. A positive correlation was found between IMA with TSH ($p< 0.0001$) in hypothyroid subjects. **Conclusion:** IMA levels in hypothyroid subjects might be useful as early marker to detect the future cardiac ischemic diseases.

Keywords: Hypothyroidism; Thyroid Profile; IMA.

I. INTRODUCTION:

Hypothyroidism is known to be one among the most common endocrine disorders resulting from insufficient production or impaired action of thyroid hormone. Thyroid hormones facilitate normal growth and function of nearly all the tissues with prominent effect on oxygen consumption. Thyroid hormone plays an important role in cell differentiation and helps to maintain metabolic homeostasis in the body; its alteration can affect the metabolism and can alter the activity of serum enzymes. Thyroid stimulating hormone (TSH) is a very sensitive and specific parameter to assess thyroid function and has importance in early detection or exclusion of thyroid disorder [1&2]. In hypothyroidism, altered thyroid hormone levels which causes increased oxidative stress and ischemic changes in heart. Under oxidative stress, Ischemia Modified Albumin (IMA) is considered as one of the marker of ischemia/reperfusion injury. Albumin has the tendency to attach to metals like copper and cobalt at N- terminus. Ischemic conditions make albumin to lose its capacity to bind to metal ions due to change in its structural confirmation at the binding site. In such incidences there is an increased release of ischemia mediator like ischemia modified albumin (IMA) into the circulation. IMA has been regarded as new and emerging marker of ischemia and oxidative stress (OXS) [3].

II. MATERIALS AND METHODS :

The present study was conducted on 80 newly diagnosed hypothyroid subjects attending the Medical OPD and Immunoassay Laboratory of the Department of Biochemistry, S.P. Medical College & Hospitals, Bikaner . The results of patients were compared with 80 healthy controls of either sex of similar age groupbetween 20-65 years. The diagnose of hypothyroidism was established, based on the clinical signs and symptoms and the T3, T4 and TSH estimations (American Thyroid Association). For control group age and sex matched healthy volunteers were selected. Patients on treatment for any thyroid disorder, liver disease, lipid lowering drugs, diabe-tes, malignancy and pregnant women were excluded. The study was approved by the Ethics committee of our college. An informed consent was taken from all the study subjects. All the anthropometric measurements were performed. Blood sample collection was done by aseptic technique and subjected to the biochemical estimations. The thyroid profile was estimated by electrochemiluminescence system, using automated Beckman coulter immuno assay analyzer. IMA was estimated by colorimetry using the albumin cobalt binding method developed by Bar-Or D et al[4]. The absorbance of the assay

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mixture was read at 450. IMA was reported in absorbance units (ABSU). P values < 0.05 were considered significant.

III. RESULTS:

Table:1 Comparison of parameters of the subjects studied.

S. No.	Parameters	Controls (Mean ± SD)	Hypothyroid subjects (Mean ± SD)	P value
1.	**Serum T3** (ng/ml)	1.27 ± 0.30	0.66 ± 0.31	p < 0.0001 (HS)
2.	**Serum T4** (µg/dl)	9.23 ± 2.29	3.75 ± 1.94	p < 0.0001 (HS)
3.	**Serum TSH** (µIU/ml)	2.46 ± 1.12	25.61 ± 15.60	p < 0.0001 (HS)
4.	**IMA (ABSU)**	0.42 ± 0..06	0.81 ± 0.10	p < 0.001 (HS)

**p < 0.001 = Highly significant (HS).

Table 2: Correlation of IMA with thyroid profile in hypothyroidism.

	Correlation (r)	P value
T3 vs IMA	-0.39	p < 0.499 (NS)
T4 vs IMA	-0.44	p < 0.097 (NS)
TSH vs IMA	0.50	p < 0.00001 (HS)

Note: p > 0.05 = Not significant (NS); * p < 0.05 = Significant; **p < 0.001 = Highly significant (HS). The Mean ± SD levels of serum T3, T4, TSH and IMA were highly significant (p < 0.0001) in hypothyroid subjects as compared with healthy control subjects (Table:1). Serum IMA showed a possitive correlation (+0.50) with TSH and negative correlation with T3 & T4 in the hypothyroid subjects (Table: 2) .

IV. DISCUSSION:

Hypothyroidism is a common metabolic disorder in the general population. It is associated with increased morbidity from cardiovascular disorder. Our results showed significantly higher levels of serum IMA in hypothyroid patients as compared with euthyroid controls . This rise in serum IMA level, though evident in hypothyroid group. Decreased thyroid hormones and increased TSH had been reported to play a major role in the generation of OXS and hence increased IMA formation [5-9]. Accordingly, there are studies in hypothyroid showing significant negative and positive correlations of IMA with thyroid hormones and TSH respectively [15,19 &23]. In support of the associations between IMA and thyroid hormones, correlation coefficient (Table 2) showed a significant positive correlation between increased IMA and elevated TSH levels in hypothyroid patients. In addition, there were negative correlations of IMA with T3, and T4 in these patients. These results indicate that hormonal disturbances are associated with increased OXS status in hypothyroid patients. Therefore, we also considered to study and report the effect of normalizing thyroid status on serum IMA levels in hypothyroid cases. our study confirmed that the estimation of IMA would be helpful in early diagnosis of ischemia changes in cardiac tissue. This may help in preventing the chances of irreversible infarction in patients with altered levels of thyroid hormones.

V. CONCLUSION:

Ischemia modified albumin levels in hypothyroid subjects might be useful as early marker to detect the future cardiac ischemic diseases.

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