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Study of Serum Insulin and Insulin Resistance in Hypothyroid Patients in Jodhpur Region (Rajasthan)

Gupta Ritu[1], Dr. Mathur Ranjana[2], Kumar Rohitash[3]

[1]M.Sc (Medicine) Biochemistry, Senior Demonstrator, Department of Biochemistry, Dr. S. N. Medical College, Jodhpur, India

[2]MD Biochemistry, Senior Professor & Head, Department of Biochemistry, Dr. S. N. Medical College, Jodhpur, India

[3]M.Sc (Medicine) Biochemistry, Senior Demonstrator, Department of Biochemistry, Dr. S. N. Medical College, Jodhpur, India

Abstract: ***Background:*** ***Disorders affecting the thyroid gland are the most common endocrinopathies. Hypothyroidism can lead to a symptom that reduces the functional status and quality of life. 17 patients of clinically established patients of hypothyroidism attending Out Patient Departments, MDM hospital Jodhpur (Rajasthan) were compared with 25 healthy subjects of either sex in Department of Biochemistry, Dr S. N. Medical College, Jodhpur for thyroid function tests and serum insulin.*** ***Method:*** ***Serum T_3, Serum T_4, Serum TSH and Serum Insulin were measured by ELISA technique while Fasting Insulin Resistance Index (FIRI) was calculated by HOMA-IR formula.*** ***Results:*** ***Serum T_3, Serum T_4 and Serum TSH of hypothyroid patients showed a highly significant ($p<0.001$) relationship with healthy control subjects while Serum Insulin and Fasting Insulin Resistance Index (FIRI) showed a non-significant ($p>0.05$) relationship.*** ***Conclusion:*** ***Estimation of serum insulin is simple, reliable, economic and sensitive and it can be used in the proper management of chronic complications of thyroid disorders.***

Keywords: FIRI, Insulin, Hypothyroidism, Insulin-resistance, TSH

1. Introduction

Thyroid disorders are the most common endocrinopathies encountered in clinical practices, both hypo and hyper secretions from the gland lead to health complications. Insufficient thyroid hormone secretion results in hypothyroidism where, hypo metabolism is the principle feature.

Thyroid hormones affect glucose absorption, utilization, glucose production and insulin degradation which ultimately have divergent influence on blood glucose level**.** These hormones regulate the effect of insulin at adipose tissues by acting on receptor and post receptor level**.**[1]

Insufficient insulin secretion and reduced insulin action at target cells were studied and found to be responsible for age related glucose intolerance in hypothyroid patients[2] whereas the synthesis and release of insulin was reported to be decreased in hypothyroid patients.[3]

Thus the primary object of this study was to delineate the usefulness of serum insulin and insulin resistance in patients of hypothyroidism with relation to thyroid hormone levels.

2. Material & Methods

The present study was conducted on 17 clinically established patients of hypothyroidism attending Out Patient Departments, MDM hospital Jodhpur (Rajasthan). The results were compared with age matched 25 healthy control subjects of either sex. Following investigation were performed in all the subjects included in this study in clinical laboratories, Department of Biochemistry, Dr. S.N. medical College, Jodhpur (Rajasthan):

1) Blood Glucose by GOD-POD methods.
2) Serum T_3, Serum T_4 and Serum TSH by ELISA technique.
3) Serum Insulin by ELISA technique.
4) Serum Fasting Insulin Resistance Index (FIRI) was calculated by HOMA-IR formula.

$$FIRI = \frac{\text{Fasting blood glucose (mmol/L)} \times \text{Fasting insulin } (\mu\text{IU/mL})}{22.5}$$

3. Results

17 patients suffering from hypothyroidism (6 males and 11 females) and 25 healthy control subjects (6 males and 19 females) were studied for thyroid function tests, serum insulin and serum insulin resistance index.

The mean values for serum T_3, serum T_4 and serum TSH were 0.5±0.22ng/mL, 2.58±1.24µg/mL and 17.60±12.74µIU/mL in hypothyroid patients while 1.07±0.31ng/mL, 7.59±2.37µg/mL and 2.04±1.30µIU/mL in healthy subjects respectively.

Mean serum insulin levels in hypothyroid patients 43.39±18.80µIU/mL show a non significant relationship ($t=0.66$; $p>0.05$) as compared to the healthy control subjects (47.73±23.63 µIU/mL) (Table: 1, 2).

Mean serum insulin and insulin resistance index were 43.39±18.80µIU/mL and12.80±11.46 in hypothyroid patients whereas 47.73±23.63µIU/mL and 10.85±6.18 in healthy subjects respectively.**(Table: 3, 4).**

A significant relationship was observed in serum ferritin levels when hypothyroid subjects ($p<0.05$) were compared with the healthy controls.**(Table: 5, 6).**

Table 1: Mean Serum Insulin (µIU/mL) of the subject studied

S. No	*Group studied*	*Serum Insulin (Mean ± S.D.) [Range]*
1	Healthy Controls (25)	47.73 ± 23.63 [5.30-115.0]
2	Hypothyroid Patients (17)	43.39 ± 18.80 [7.20-83.4]

Table 2: Statistical analysis of Serum Insulin among the studied

	Group Compared	*t-value*	*p-value*
1	Healthy controls v/s Hypothyroids	0.66	p>0.05 (NS)

* NS = Non Significant
* HS = Highly Significant

Table 3: Mean Serum Insulin Resistance [IR] of the subjects studied

S. No	*Group studied*	*Serum IR (Mean ± S.D.) [Range]*
1	Healthy Controls (25)	10.85 ± 6.18 [1.39-29.78]
2	Hypothyroid Patients (17)	12.88 ± 11.46 [1.46-51.21]

Table 4: Statistical analysis of Serum Insulin Resistance among the groups studied

	Group Compared	*t-value*	*p-value*
1	Healthy controls v/s Hypothyroids	0.67	p>0.05 (NS)

* NS = Non Significant
* HS = Highly Significant

Table 5: Mean Serum Ferritin of the subjects studied

S.No	*Group studied*	*SerumFerritin (Mean ± S.D.)[Range]*
1	Healthy Controls (25)	93.72 ± 50.66 [19.0-205.0]
2	Hypothyroid Patients (17)	29.94 ± 20.66 [7.0-65.0]

Table 6: Statistical analysis of Serum Ferritin among the groups studied

	Group Compared	*t-value*	*p-value*
1	Healthy controls v/s Hypothyroids	2.26	p < 0.05 (S)

* S = Significant
* HS = Highly Significant

4. Discussion & Conclusion

In this study, a highly significant correlation was observed when serum T_3 of hypothyroid subjects was compared with healthy subjects. The results of this study were concordant with Coulmbe P *etal* (1976)[4] and Geola FL *etal* (1980)[5]. Serum T_4 of hypothyroids also showed a highly significant correlationship with healthy subjects. Similar results were also reported by Pykalisto O *etal* (1976)[6] and Mehta S *etal* (1999).[7]

Similar results were observed for serum TSH and the results were in accordance with the studies of Komiya I *etal* (1984)[8] and De Bruin TWA (1993).[9]

Serum insulin and insulin resistance showed a non-significant relationship between the both group studied and the results were matched with the study of Premchand BN *etal* (1992).[10]

Estimation of serum insulin and calculation of fasting insulin resistance index (FIRI) is simple, reliable, economic and sensitive and it can be used in the proper management of chronic complications of thyroid disorders.

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Author Profile

Ritu Gupta is Senior demonstrator, Department of Biochemistry in Dr. S.N. Medical College, Jodhpur (Rajasthan), India