



## SERUM RESISTIN CHANGES ASSOCIATED WITH THYROID DISORDERS

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### ABSTRACT

Thyroid abnormalities are accompanied by changes in intermediary metabolism including alteration in body weight, insulin resistance and lipid profile. Thyroid hormones are involved in the regulation of adipose tissue whereas the hormones produced by adipose tissue such as resistin, adiponectin, and leptin are involved in regulation of the energetic balance. A cross sectional study was performed on 100 patients between 15-60 years age group, along with 50 age matched healthy Control group in J.L.N. hospital Ajmer. Serum T<sub>3</sub> and TSH level were estimated by Radioimmunoassay (RIA) method, and serum Free T<sub>4</sub> and serum Resistin level by ELISA of Bio-Rad pw40. The increase in serum Resistin level was observed statistically highly Significant ( $p < 0.0001$ ) in hypothyroid subjects and in hyperthyroid subjects ( $p < 0.0001$ ). Disturbances in thyroid hormones in thyroid diseases have an essential effect on the levels of adiponectin and resistin released by adipose tissue. They play a role in the regulation of the adipocytokines which are involved in the regulation energy balance. We were concluded that measurement of Resistin possibly can prevent the false diagnosis of thyroid assessment and may be offer more effective interventions to improve patients care and the economy aspect.

**KEY WORDS:** Resistin, hypothyroid, adiponectin, hyperthyroid.

### INTRODUCTION

Thyroid hormone, Thyroxin, and Triiodothyronine play an important role in a wide range of physiological processes in mammals, including growth, development differentiation, and basal metabolic homeostasis<sup>[1]</sup>. Thyroid abnormalities are accompanied by changes in intermediary metabolism including alteration in body weight, insulin resistance and lipid profile<sup>[2]</sup>. It has been understood that adipose tissue is not only a passive energy reservoir; it is but also an active endocrine tissue<sup>[3]</sup>. Thyroid hormone action has long been recognized as an important determinant of glucose homeostasis<sup>[4]</sup>. Thyroid hormones are involved in the regulation of adipose tissue whereas the hormones produced by adipose tissue such as resistin, adiponectin, and leptin are involved in regulation of the energetic balance<sup>[5]</sup>. Thyroid hormones regulate the body's energy balance and have effects on adipokine level<sup>[6]</sup>. Resistin likely is a hormone that linking obesity to diabetes. It is a serine and cysteine rich molecule. This hormone contains 108 amino acids with a molecular weight 12.5 KDa in humans<sup>[7]</sup>. Resistin has an important role in obesity, energy homeostasis and in many other metabolic pathways same as thyroid hormones Resistin is a hormone and adipokine that is expressed predominantly in adipocytes. It was originally named for its resistance to insulin<sup>[6]</sup>, although resistin-like molecules are expressed by other tissues also. It circulates in the blood and is a peptide hormone that belongs to a family of tissue specific resistin like molecules<sup>[7]</sup>. Resistin has the endocrine effect including effects on obesity and insulin resistance and it also plays a role in energy homeostasis. Resistin plays a role in inflammation and is a potential biomarker in cardiovascular and many other diseases<sup>[8]</sup>. Some studies

with different results on resistin concentration in patients with hyperthyroidism and hypothyroidism have been reported<sup>[9]</sup>. Authors studied the association of thyroid disorders and serum resistin at population residing in Ajmer, Rajasthan.

### MATERIAL & METHODS:

A cross sectional study was conducted on 100 patients with 50 year age matched healthy control between age group between 15-60 years in J.L.N. hospital Ajmer, Rajasthan, India. They were further divided in to hyperthyroidism and hypothyroidism.

Group 1: hypothyroid subjects (n=50)

Group 2: hyperthyroid subjects (n=50)

Group 3: healthy control subjects (n=50)

#### Exclusion criteria

Patients with Atherosclerosis, diabetes mellitus, on treatment concerning thyroid dysfunction, with any inflammatory or medical condition which would have influenced the parameters under study, were excluded from the study. Participants gave written informed consent before taking part in the study. Blood samples were collected by venupuncture by aseptic technique and samples with signs of hemolysis were discarded. Then centrifuged at 2500-3000 RPM, serum separated from the samples were analyzed for following biochemical parameters:- T<sub>3</sub> and TSH by Radioimmunoassay (RIA) method, serum Free T<sub>4</sub> and serum Resistin level by ELISA of Bio-Rad pw40<sup>[10]</sup>.

The statistical analysis was done by the unpaired two tailed 't' test and the Pearson's correlation coefficient by using online calculator. The data were presented as mean

with SD. The statistical significance was kept as a P value of < 0.05.

**RESULT**

This study was conducted to find the status of serum Resistin levels in hypothyroid and hyperthyroid subjects. The mean ± SD value of serum Resistin level in healthy control subjects was 7.10±1.8 ng/ml, in hypothyroid subjects was 9.4±2.64 ng/ml and in hyperthyroid subjects was 12.98±2.8 ng/ml.

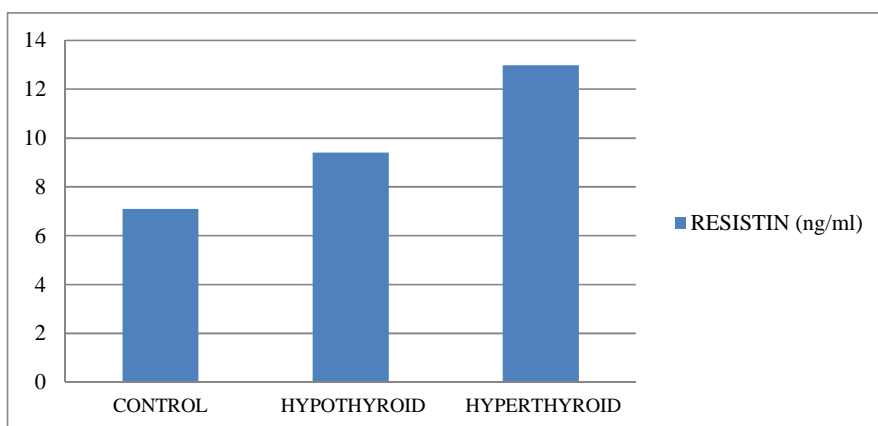
The increase in serum Resistin level was observed statistically highly Significant (p<0.0001) in hypothyroid

subjects (Table II, Fig.1) and in hyperthyroid subjects (p<0.0001) (Table III, Fig.1) when compared with healthy control subjects. Comparison of hyperthyroid subjects with hypothyroid subjects shows that the increase in resistin level is statistically significant (p=0.0015).

Pearson correlation (r) analysis was used to determine the correlation of serum RESISTIN levels with TSH in thyroid dysfunction. Resistin positively correlated with TSH in hypothyroid subjects (r= 0.13) (fig-2) and in hyperthyroid subjects (r=0.08) (Fig-3).

**TABLE 1:** Serum thyroid hormone levels of hypothyroid and hyperthyroid subjects

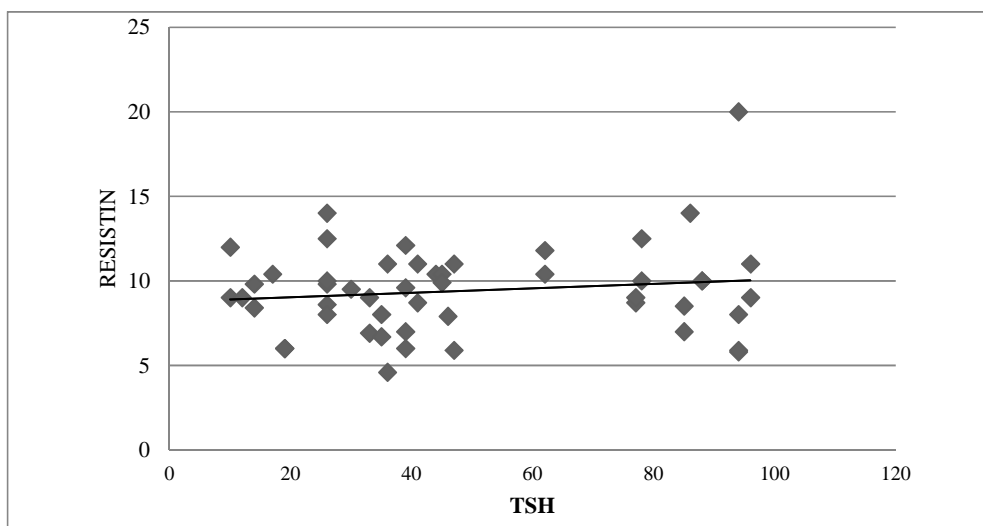
S. No.	Parameter	Control	Hypothyroid subjects	Hyperthyroid subjects
1.	T <sub>3</sub> ( ng/ml)	1.34±0.39	0.59±0.36	2.41±0.64
2.	FT <sub>4</sub> (ng/dl)	1.1±0.3	0.46±0.2	3.1±0.7
3.	TSH( µIU/ml)	2.29±0.9	49.1±27.9	0.08±0.05



**FIGURE 1:** The comparison of resistin (ng/ml) levels during hypothyroidism and hyperthyroidism

**TABLE II:** Comparison of serum resistin levels of control and hypothyroid subjects

S.No.	Biochemical parameter	Control	Hypothyroid subject	t Value	p*value
1	Resistin (ng/ml)	7.10±1.8	9.4±2.64	6.4	<0.0001



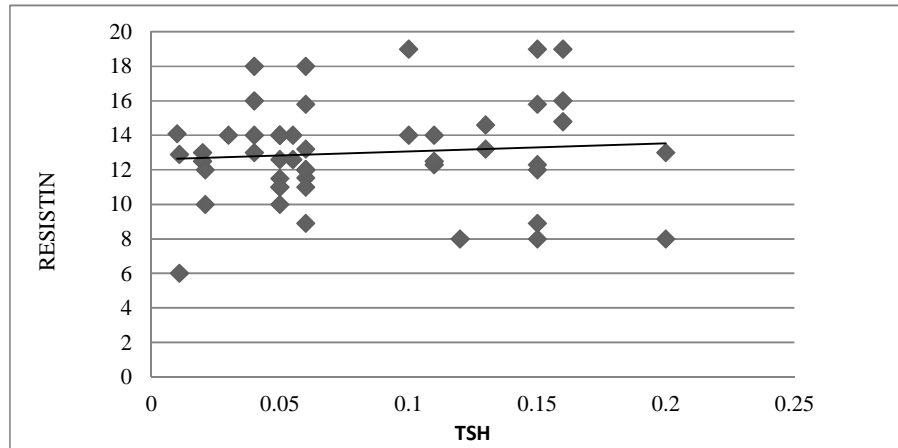
**FIGURE 2:** Linear correlation between serum RESISTIN and TSH in Hypothyroid subjects

**TABLE III:** Comparison of serum resistin levels of control and hyperthyroid subjects

S.No.	Biochemical parameter	Control	Hyperthyroid subject	t Value	p*value
1	Resistin (ng/ml)	7.10±1.8	12.98±2.8	12.4	<0.0001

**TABLE IV:** Comparison of TSH with resistin

Subjects	TSH	Resistin	p*Value
Hypothyroid Subjects	49.1±27.91	9.41±2.64	<0.0001
Hyperthyroid subjects	0.08±0.05	12.98±2.8	<0.0001

**FIGURE 3:** Linear correlation between serum RESISTIN and TSH in Hyperthyroid subjects

## DISCUSSION

Adipose tissue is a highly active endocrine organ secreting a number of bioactive molecules. Since TSH receptors have been found in the adipose tissue indicating that they play a role in the regulation of the adipocytokines which are involved in the regulation energy balance<sup>[11]</sup> in our study we were found increase in serum level of resistin in patients with thyroid dysfunction. The resistin serum level in patients with hypothyroidism (6.24±0.63) and hyperthyroidism (7.93±0.86) was significantly higher than the control group (3.15±0.16), this was similar with the study of Mehdi Hedayati *et al.* (2014)<sup>[12]</sup>. In similar manner this study was correlated with the study of Azza M. Abdu Allah *et al.* (2011)<sup>[13]</sup>, according to them thyroid hormones have direct effect on resistin but not on leptin. Serum resistin was statistically higher in the hyperthyroid group (13.8±3.66)ng/ml than both the hypothyroid group (6.316±3.413) ng/ml and the control group (6.900±1.968) ng/ml. Our studies are in agreement with their results). This correlation was independent of BMI changes in patient disturbances in thyroid hormones in thyroid diseases have an essential effect on the levels of adiponectin and resistin released by adipose tissue<sup>[14]</sup>. Resistin concentrations are increased in hyperthyroidism, they are not associated with body weight, body fat, waist circumference or BMI, which makes it unlikely that resistin plays a crucial part in thermogenesis and energy homeostasis in thyrotoxic patients<sup>[15]</sup>. In our study we were found that increased Resistin levels are related with thyroid dysfunction. This study was correlated with the study of Ceren Eke Koyuncu *et al.* (2013)<sup>[16]</sup> according to

them - increased Resistin levels are directly related to thyroid dysfunction and changes in levels of thyroid hormones may affect synthesis and secretion of resistin in adipose tissue and macrophages.

In addition, serum IGF-1 levels decrease in hypothyroid status and correlate negatively with TSH levels. GH/IGF-1 axis may be influenced in clinical or sub clinically hypothyroid patients. Changes in adipokine secretion with thyroid dysfunction may represent adaptive mechanism to the decrease or increase in basal energy expenditure and in energy substrate requirement in thyroid dysfunction<sup>[5]</sup>. In hyperthyroid patients, resistin was increased and ghrelin was decreased, they were not related to anthropometric parameters, and they normalized after of treatment hyperthyroidism. Subhashini Yaturu *et al.* (2004)<sup>[17]</sup> also shows strong positive correlation of both resistin and adiponectin with thyroid hormones. Serum levels of leptin did not change with change in the thyroid functional status.

## CONCLUSIONS

Changing in serum level of resistin may be considered as a marker for diagnosis of thyroid dysfunction. Thus the measurement of resistin possibly can prevent the false diagnosis of thyroid assessment and may be offer more effective interventions to improve patients care and the economy aspect.

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**Abbreviations used:** T<sub>3</sub>, 3,3,5-Triiodo- thyronine T<sub>4</sub>, Thyroxin. TSH thyroid stimulating hormone