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Estimation of Chemerin in Iraqi Diabetic Women Patients with Hypothyroidism

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Abstract **Background:** Energy equilibrium and metabolic homeostasis are disturbed by hypothyroidism, which is characterised by insufficient Thyroid Hormone (TH) production. The metabolic effects of chemerin, a newly identified adipokine produced from adipose tissue, have drawn attention. It attaches itself to the G-protein-coupled receptor CMKLR1, sometimes referred to as GPCR-DEZ or Chem R23. **Objectives:** assessment of Chemerin level in Iraqi diabetic female patients with hypothyroidism. Topics and approaches: During the period of "1 June 2024-1 September 2024," 50 patients who were at least 30 years old and had been diagnosed with diabetes mellitus with hypothyroidism by a specialist were recruited for the study from the Al-Yarmouk Teaching Hospital. A 40 controls of seemingly healthy individuals was selected among those who were not ill at the time, taking into account the patients' age and sex. **Results:** Findings: The baseline mean level of serum chemerin was considerably different between patients and controls ($p<0.001$), and there was a significant difference between study groups ($p<0.001$). chemerin level demonstrated high sensitivity and specificity for distinguishing between patients and controls, as well as a flawless AUC. **Conclusion:** In hypothyroidism, chemerin, an inflammatory marker, tended to be elevated and statistically significant. The role of adipokine and inflammation in the development of hypothyroidism and to assess whether these parameters could serve as potential biomarkers.

Key Words Chemerin, Hypothyroidism, Diabetes Mellitus, Iraqi Women, Adipokine, Inflammation, CMKLR1, Thyroid Hormones, Metabolic Homeostasis, Biomarker

INTRODUCTION

Hypothyroidism, characterised by insufficient production of Thyroid Hormones (THs), disrupts energy balance and metabolic homeostasis [1].

Thyroxine (T4) and Triiodothyronine (T3), two thyroid hormones, are important modulators of metabolic rate that affect the metabolism of proteins, fats, and carbohydrates [2]. Weight gain, insulin resistance, and dyslipidemia are just a few of the metabolic disorders that can result from thyroid hormone dysregulation [3].

Common symptoms of hypothyroidism are usually sluggish at onset and include fatigue, dry skin, cold susceptibility, hair loss, constipation, voice changes, and slower movement and thought [4].

Diagnosis

The symptoms of hypothyroidism can be different from person to person. And they often look like symptoms of other health issues. Because of that, a diagnosis of hypothyroidism doesn't rely on symptoms alone. It's usually based on the results of blood tests.

The first blood test typically done to diagnose hypothyroidism measures the level of Thyroid-Stimulating Hormone (TSH) in the blood. If it's high, the test is done again, along with a blood test for the thyroid hormone T-4. If the results show that TSH is high and T-4 is low, then the diagnosis is hypothyroidism.

The metabolic effects of chemerin, a newly identified adipokine produced from adipose tissue, have drawn attention. Adipose tissue, liver, kidney, pancreas, lungs, ovaries, and the pituitary gland are among the organs that express chemerin, which binds to the G-protein-coupled receptor CMKLR1, often referred to as ChemR23 or GPCR-DEZ [5]. Chemerin, which has paracrine and autocrine effects, is synthetized from adipose tissue. It activates lipolysis and metabolic pathways in an autocrine fashion.

It also plays a filament in the chronic low-grade inflammation associated with obesity through paracrine effects. [6]. Initially identified as a chemotactic protein, chemerin acts via its receptor CMKLR1, which is expressed on neutrophils as well as activated macrophages and dendritic cells. Chemerin has been involved with adipogenesis, osteoclastogenesis, angiogenesis, type 2 diabetes, Crohn's disease, Metabolic Syndrome (MetS), and arthritis [7]. Other functions of chemerin include tissue remodelling, cell proliferation and immune responses [8].

Differences in chemerin level of expression between cell types and tissue have an important influence on several illness problems (obesity, cancer, inflammation, heart disease and vascular diseases) [9-11].Several metabolic and inflammatory mediators, including glucose, fatty acids, insulin, immunoregulatory cytokines, and nuclear receptor activators, including glucocorticoids, retinoids, and vitamin D, have been suggested to have an impact on the regulation of chemerin expression, which is specific to various tissues [12,13].

Chemerin's Role in Hypothyroidism

Chemerin's role in hypothyroidism is emerging as a critical link to metabolic dysfunction. Studies have shown that people with thyroid dysfunction exhibit different patterns in their blood levels of chemerin, with hypothyroidism patients showing higher amounts of chemerin. Elevated chemerin in hypothyroidism correlates strongly with TSH and metabolic markers. There are multiple important links between chemerin and thyroid function: (1) an inverse relationship with HDL cholesterol (2) a positive correlation with TSH levels (3) a direct correlation with BMI and triglycerides and (4) a negative correlation with T3 and T4 levels [7].

METHODS

Case controls study design, Between "1 June 2024-1 September 2024," 50 individuals who were at least 30 years old and had been diagnosed with diabetes mellitus and hypothyroidism by a specialist were recruited for the study from the Al-Yarmouk Teaching Hospital. Age and sex matching with patients were taken into account when recruiting apparently healthy controls from those who were not ill at the time "check by blood test" (all patients and controls are women).

Blood Analysis

Both patients' and controls' blood samples were taken. Serum was isolated, divided into aliquots, and utilized for thyroid function and chemerin tests. These tests relied on the use of enzyme-linked immune sorbent assay kits "the principle of kit is sandwich method also detected by pg./mL" , which were provided by My BioSource Company, USA.

Statistical Analysis Data

Statistical analysis data were examined using the SPSS-24 statistical software. The data was presented using the mean, standard deviation of the mean, and percentage once it was confirmed that the data was regularly distributed by use the normal distribution curve. The difference between two means was tested using the t-test. Statistical significance was defined as a p-value of "<0.05." ROC curve analysis measures the specificity and sensitivity of biomarker research also cutoff value by Youden index.

RESULTS

Table 1 displays the clinical features of the research participants. The age distribution of the patients and the controls were individually matched (Table 2,3 and Figures 1-3).

DISCUSSION

An adipokine called chemerin has gained a lot of attention due to its role in several physiological processes, including inflammation, adipogenesis, and energy metabolism [14]. While it has a reasonably well-established role in several metabolic illnesses, including type 2 diabetes and obesity [15], its possible significance in thyroid dysfunction, specifically hypothyroidism, is still being studied and discussed.

Table 1: Laboratory Investigations of Subjects of Study

Patients No= 50		Controls No = 40	
	Mean±SD		p value
AGE years	30.85±6.24	28.98±8.24	0.071
BMI	28.92±6.44	24.26±8.98	0.052
Chemerin pg/mL	0.431±0.17	0.19±0.036	0.001
TSH mlU/L	9.26±1.87	2.80±0.93	0.001
T4 pg/mL	2.20±0.44	8.01±0.04	0.001
T3 pg/mL	0.22±0.049	1.41±0.045	0.034

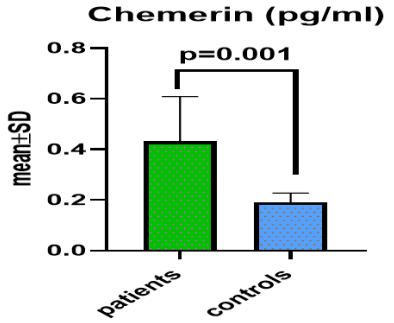

Figure 1: Chemerin (pg/mL) Levels in Patients and Controls

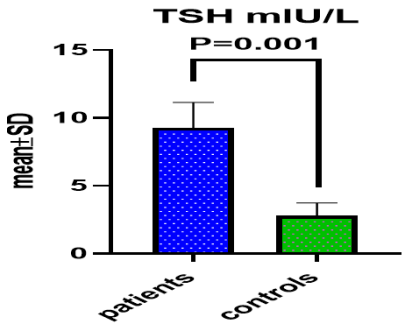

Figure 2: TSH mlU/L Levels in Patients and Controls

Table 2: Correlations between Study Biomarkers for Patients

Chemerin			TSH	T4	T3	BMI	age
Chemerin	r	-0.132	-0.132	-0.133	-0.170	-0.365**	-0.132
	p value		0.316	0.312	0.195	0.004	0.316
	N		50	50	50	50	50
TSH	r		1.000**		0.962**	0.194	1.000**
	p value	0.316	0.000		0.000	0.137	0.000
	N	50		50	50	50	50
T4	r	-0.133	1.000**		0.963**	0.195	1.000**
	p value	0.312	0.000		0.000	0.136	0.000
	N	50	50		50	50	50
T3	r	-0.170	0.962**	0.963**		0.207	0.962**
	p value	0.195	0.000	0.000		0.113	0.000
	N	50	50	50		50	50
BMI	r	-0.365**	0.194	0.195	0.207		0.194
	p value	0.004	0.137	0.136	0.113		0.137
	N	50	50	50	50		50
age	r	-0.132	1.000**	1.000**	0.962**	0.194	
	p value	0.316	0.000	0.000	0.000	0.137	
	N	50	50	50	50	50	

**.Correlation is significant at the 0.01 level (2-tailed)

Table 3: ROC Curve Analysis between Patients and Controls

	Chemerin				95% Confidence Interval	
Test	Area	cutoff	Sensitivity	Specificity	Lower Bound	Upper Bound
Chemerin	0.987	0.23	98.3	99.45	0.965	1.000
TSH	1.00	4.6	1.00	1.00	1.000	1.000

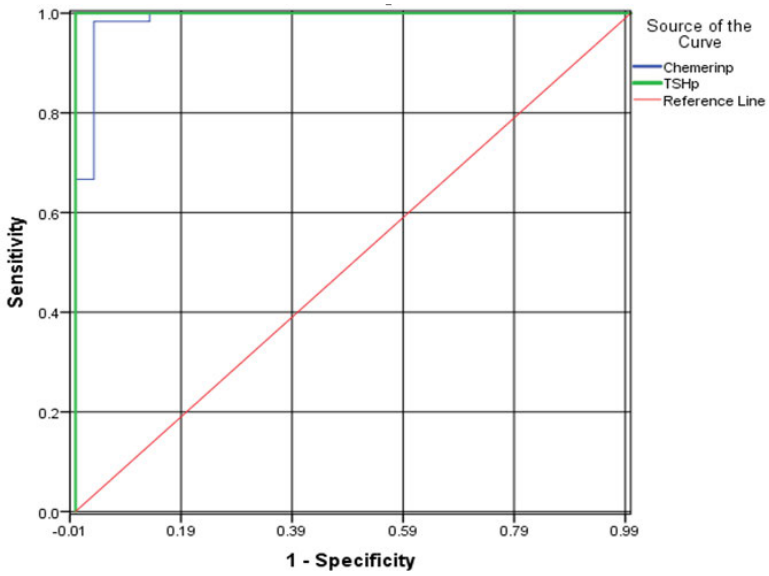

Figure 3: ROC Curve Analysis of Chemerin and TSH between Patients and Controls

Studies have shown that people with thyroid dysfunction exhibit different patterns in their blood levels of chemerin, with hypothyroidism patients showing higher amounts of chemerin [16]. Elevated chemerin in hypothyroidism correlates strongly with TSH.

According to the outcome data, hypothyroid patients had a substantially greater (mean± SD) level of chemerin than the control group. These findings were consistent with a study by Edrees *et al.* [16] that found that patients with hypothyroidism had higher serum chemerin levels. Although chemerin has been connected to metabolic diseases [14], more research is necessary to determine its precise function in the aetiology of hypothyroidism and its related consequences. n addition, the level of chemerin is significantly associated with metabolic derangements and impaired energy homeostasis caused by low thyroid hormone levels in patients with hypothyroidism [17]. Al-Doghaither *et al.* [18] suggest that thyroid hormones, chemerin, and the regulation of metabolism has an intricate interaction which may play a role in contributing to the overall pathophysiology of hypothyroidism. Thyroid hormones (T3) mediate gene expression through nuclear receptor complex interactions with coactivators/corepressors that impact mRNA stability and translation [19]. Recent evidence indicates direct modulation of chemerin secretion by TSH through TSHR

signalling in adipocytes, independent of T3/T4 [20]. In hypothyroidism, increased TSH stimulates cAMP-PKA-dependent signalling to enhance RARR ES2 (chemerin) transcription in adipocytes [20], fuelling CMKLR1 that aggravates inflammation.

CONCLUSION

In hypothyroidism, chemerin, an inflammatory marker, to be elevated and statistically significant. Further studies with larger sample sizes are needed to clarify the role of adipokine and inflammation in the development of hypothyroidism and to assess whether this parameter could serve as potential biomarker.

Conflicts of Interest

The writers did not disclose any conflicts of interest.

Ethical Statement

This study has been approved by the scientific committees of the local health care department in Al-Karkh, Baghdad province. Each patient was given an explanation of the study's objectives in order to gain their consent to participate.

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