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ORIGINAL ARTICLE

Assessment of Serum Resolvin (E1) Level in Hashimoto's Thyroiditis

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ABSTRACT

Background: Hashimoto's thyroiditis (HT) is the most prevalent autoimmune thyroid condition worldwide and the main etiology of hypothyroidism in iodine-sufficient areas. The present study aimed to identify the role of Resolvin E1 (REV1) in protecting the thyroid gland against increased levels of thyroid peroxidase antibodies (TPOAb) and thyroglobulin antibodies (TgAb) in patients with euthyroid HT.

Subjects and methods: This case-control study was conducted on 76 subjects allocated into two groups. The Patient group included 38 euthyroid Hashimoto's thyroiditis patients (TPO Ab and/or TgAb +ve). The control group included 38 age and sex-matched healthy non-diseased individuals. Resolvin E1 samples were collected on admission.

Results: There was a substantial variance between the groups concerning TPOAbs and TgAbs with increased anti-TPO and TgAbs values in the case group and reduced RVE1 levels in the cases group p<0.001). There was a substantial inverse association between Serum RVE1 levels with TPOAbs and TgAbs (P=0.02 and 0.03, respectively). In univariate regression analysis, age (odd ratio (OR)=1.54, 95 % Confidence Interval (CI)=٢.47–٣.43, p=0.002), sex (OR=1.18, CI=10.80–12.22, p=0.016), Tg-Abs (OR= 1.11, CI= 1.31–3.47,p< 0.001), and RVE1 (OR=1.01, CI of 11.58–2.42, p=0.007) were significant predictors for increasing TPO Ab levels in euthyroid Hashimoto's thyroiditis patients. In multivariate regression analysis, Tg-Abs (OR = 1.13, 95 % CI = 1.81–4.33, P = 0.003) and RVE1 (OR = 1.01, 95 % CI = 1.31–3.47, P = 0.006) were significant predictors for increasing TPO Ab levels in euthyroid Hashimoto's thyroiditis patients.

Conclusions: HT cases had substantially lower serum RVE1 concentrations. RVE1 may also offer protection against elevated TgAb values.

Keywords: Hashimoto thyroiditis; Resolvin E1; Thyroid peroxidase antibodies (TPOAb); Thyroglobulin antibodies (TgAb)

INTRODUCTION

Hashimoto thyroiditis (HT) is an autoimmune condition caused by immunological mechanisms mediated by cells and antibodies that damage thyroid cells. In developed nations, it is the most prevalent cause of hypothyroidism [1]. HT is characterized by an increasing level of thyroid-specific antibodies, mainly thyroid peroxidase antibodies (TPOAbs) and thyroglobulin antibodies (TgAbs), which indicate the severity of thyroid autoimmune damage. Primary hypothyroidism eventually develops in the majority of HT cases [1]. Elevated thyroid auto Abs (AAbs) not only results in hypothyroidism but also plays a crucial role in the advancement of hypothyroidism. Research on euthyroid HT cases showed that impaired vestibular function and a reduced quality of life (QoL) score can result from elevated thyroid AAbs [2].

Since euthyroid HT cases currently face the aforementioned stress, early detection and treatment are critical. Chronic inflammation is the primary cause of illness development in many autoimmune disorders. According to recent investigations,

endogenous lipid mediators could help prevent the development of chronic inflammatory disorders [3].
The resolution procedure consists of eliminating the toxic compounds that cause the inflammatory reaction, halting the production of proinflammatory mediators and encouraging their deconstruction and metabolism, and finally ending leukocyte migration. Lymphocytes and neutrophils induce apoptosis or necrosis and are eventually removed by macrophages [4].
Furthermore, alleviating inflammation is a dynamic process triggered by endogenous specific pro-resolving mediators (SPMs), which are secondary products of polyunsaturated fatty acids (PUFAs), including maresins, lipoxins, resolvins, and protectins. [5].
Resolvin E1(RVE1) is a member of the Resolvin E series, which is synthesized from eicosapentaenoic acid (EPA) and activates every component of the pro-resolution process, from preventing lymphocyte clumping at the inflammation region to inflammatory debris phagocytosis or elimination [5].
Additionally, RVE1 protects a variety of chronic inflammatory conditions. RVE1 stimulates the production of its particular receptor, chemR23, on the dendritic cell surface and suppresses the secretion of IL-12, impeding inflammatory development [6].
Several studies have demonstrated a possible association between RVE1 and Hashimoto thyroiditis. So, this study aimed to identify the role of RVE1 in protecting the thyroid gland against increased levels of TPOAb and TgAb in cases with euthyroid HT at Zagazig University Hospitals.

METHODS

Patients:
This case-control investigation was conducted at Zagazig University Hospitals, Endocrinology Unit, Internal Medicine Department. This study included 76 subjects allocated into two groups: The Patient group included 38 euthyroid Hashimoto's thyroiditis patients (TPO Ab and/or TgAb +ve). Control group: included 38 age and sex-matched healthy subjects. Written informed consent was obtained from all patients, and the study was approved by the research ethical committee of the Faculty of Medicine, Zagazig University (ZU-IRB #10735-4/6-2023). The research was conducted under the World Medical Association's Code of Ethics (Helsinki Declaration) for human research.
Cases with the following characteristics were included: age 18 – 65, euthyroid HT patients (TPO-Ab and/or TgAb +ve), patients with goiter, hypothyroidism-suggesting symptoms, positive family history of thyroid disorders (in the cases group), and age and sex-matched healthy subjects (in the control group) (Figure 1).
This work included 76 subjects divided into two groups: the patient group, which included 38 untreated Hashimoto's thyroiditis patients (TPO Ab and/or TgAb +ve), and the control group, which included 38 age and sex-matched healthy non-diseased subjects.
Cases with the following characteristics were excluded: age < 18 years or > 65 years, history of another auto-immune disease, any acute or chronic illness, current use of medications, pregnancy, smoking or alcohol intake, and any other criteria not fulfilling inclusion criteria.
All the study population had the following: Detailed history taking from patients or relatives (Age, sex, family history of thyroid disorders & excluding chronic illness). Clinical and local examination of thyroid, radiological assessment (Neck ultrasound), Laboratory and biochemical investigations on admission.
Samples: Peripheral blood (PB) samples were collected from all patients at presentation time. Venous blood samples were aseptically withdrawn from each patient. One ml of the sample was delivered into a sterile container containing EDTA for a complete blood count (CBC) examination. 0.5 ml of the sample was delivered into a sterile vacutainer containing EDTA, and 1.5 ml was delivered into a plan vacutainer tube to detect serum Resolvin E1 level by ELISA technique.

Routine laboratory tests

Complete blood count (CBC): by automated cell counter "Sysmex1000" (Sysmex Corporation, Japan). ***Thyroid, liver, and kidney function tests & Lipid profile:*** measured spectrophotometrically using automated analyzer "Roche Cobas 8000-702" (Roche Diagnostics, Germany). TPO-Ab& TgAb: by Cobas e 411 automated analyzer (Roche Diagnostics, Germany).

Resolvin E1 evaluation:

Measurement of serum Resolvin E1 by ELISA (Enzyme-linked immunosorbent assay) using RVE1 kit (cloud-clone crop company) according to the manufacturer's instructions. The method used in the present study was an enzyme immunoassay for competitive inhibition. A microplate has been pre-coated with a monoclonal antibody specific to RVE1. Using the pre-coated antibody specific to RVE1, a competitive inhibitory reaction was initiated between biotin-labeled and unlabeled RVE1 (Standards or samples). We washed out the unbound conjugate

after incubation. The following step was to incubate avidin-conjugated to HPP in each microplate well. Reverse proportionality between RVE1 concentration and bound HRP conjugate quantity was observed. Substrate solution addition caused a color intensity inversely related to RVE1 concentration. The normal lab reference range of Resolvin E1 was 3 - 900 pg/ml.

STATISTICAL ANALYSIS

SPSS 26.0 software (SPSS, Chicago, IL, USA) was used for the statistical analysis. Normally distributed data are expressed as the mean ± standard deviation (M ± SD), and comparisons were performed with independent samples t-tests. Data with abnormal distributions are expressed as the median, and the distributions between groups were compared using the nonparametric Mann-Whitney U test. The ANOVA test was used to compare two or more quantitative variables, while the Chi-square test was employed to analyze categorical variables. Pearson Correlation was used to study the relationship between quantitative variables. A receiver operating characteristics (ROC) curve was plotted to evaluate the diagnostic performance of studied markers. Multiple regression analysis was done, where Logistic regression coefficients were calculated and used to estimate Odds ratios for different independent factors to evaluate relationships between RVE1 and increasing TPOAb levels. P<0.05 were considered significant.

RESULTS

Concerning the demographic data, the mean age of the case group was 37.7±8.4. The mean age of the control group was 37.3±7.5. Regarding sex, 21% were males and 79% were females in the case group, while 18% were males and 82% were females in the control group. There was a highly statistically significant difference regarding a Positive family history of thyroid disorders in the case group compared to healthy individuals (Table 1).

Regarding the laboratory data, no remarkable variances were detected between the groups respecting liver and kidney function, CBC, and lipid profile (Table 2).

There was a substantial variance between the groups concerning TPOAbs and TgAbs, with increased anti-TPO and TgAbs values in the case group and reduced RVE1 levels in the cases group p<0.001). (Table 3).

There was a substantial inverse association between Serum RVE1 levels with TPOAbs and TgAbs (P=0.02 and 0.03, respectively) (Table 4). There was a substantial inverse relationship between Serum RVE1 levels and TPOAbs and TgAbs in normal individuals (P=0.03 and 0.04, respectively) (Table 5).

In univariate regression analysis, age (odd ratio (OR)=1.54, 95 % Confidence Interval (CI)=٢.47–٣.43, p=0.002), sex (OR=1.18, CI=10.80–12.22, p=0.016), Tg-Abs (OR= 1.11, CI= 1.31–3.47,p< 0.001), and RVE1 (OR=1.01, CI of 11.58–2.42, p=0.007) were significant predictors for increasing TPO Ab levels in euthyroid Hashimoto's thyroiditis patients. In multivariate regression analysis, Tg-Abs (OR = 1.13, 95 % CI = 1.81–4.33, P = 0.003) and RVE1 (OR = 1.01, 95 % CI = 1.31–3.47, P = 0.006) were significant predictors for increasing TPO Ab levels in euthyroid Hashimoto's thyroiditis patients (Table 6).

Table (1): Demographic data of the studied groups:

Variable		Case Group (N=38)		Control Group (N=38)		Test*	P-value
Age(years) mean±SD		37.7 ±8.4		37.3±7.5		0.04	0.96
BMI (Kg/m2)		23.03 ± 2.42		21.67 ± 2.9		0.04	0.96
		N	%	N	%	χ^2 test	P-value
Sex	Male	8	21	7	18	0.4	0.8
	Female	30	79	31	82		
Positive family history of thyroid disorders	**yes**	20	52.6	0	0	**36.19**	**<0.001****
	no	18	47.4	38	100		

Table (2) laboratory data of studied groups using independent t- test.

	Case Group (N=38)	Control Group (N=38)	t-test	P
ALT (10- 40 U/L)	31.5±6.2	29.8±7.4	0.87	>0.05 NS
AST (10 – 40 U/L)	26.4±6.4	27.5±7.4	0.56	>0.05 NS
Bil (Up to 1.2 mg/dl)	0.9 ± 0.2	0.9 ± 0.2	0.0	>0.05 NS
Alb (3.5-4.9 g/dl)	3.7 ± 0.1	3.6 ± 0.2	1.8	>0.05 NS
PT (11-14 sec)	12.5 ± 1.1	13 ± 0.8	-1.5	>0.05 NS
PTT (26-42 sec)	33.3 ± 4.8	32.8 ± 5.5	1.7	>0.05 NS
FBS (70-100 mg/dL)	88.3 ± 15	85.4 ± 5.7	0.7	>0.05 NS
PPS (Less than 140 mg/dL)	135.9 ± 19.3	129.5 ± 4.8	1.3	>0.05 NS
HB (12.5-17 g/dl)	13.6 ± 0.8	14.2 ± 0.9	-4.8	>0.05 NS
WBC (4-11 103 /µL)	9.511 ± 1.852	9.813 ± 1.597	-0.6	>0.05 NS
RBCs (10^{12}\L)	5.9 ± 0.57	5.84 ± 0.58	4.82	>0.05NS
PLT (x10^9L)	330.5 ± 26.719	299.5± 56.719	2.9	>0.05 NS
S.Cr (0.7-1.2 mg/dL)	0.86 ± 0.3	0.9 ± 0.2	0.6	>0.05 NS
UA (2-7 mg/dl)	5.5 ± 0.6	5.6 ± 0.7	-0.9	>0.05 NS
Cholesterol (Up to 200 mg/dl)	١٨٠.6 ± 42.8	179.5 ± 7.1	1.4	>0.05 NS
HDL-Ch (40-60 mg/dl)	41.4 ± 3.7	50.8 ± 2.9	-1.4	>0.05 NS
LDL-Ch (60-100 mg/dl)	70.5 ± 6.7	65.5± 6.9	2.1	>0.05 NS
Triglycerides (Less than 150 mg/dl)	120.7 ± 42.5	112.7 ± 12.2	2.7	>0.05 NS

ALT: alanine transaminase, **AST**: aspartate aminotransferase, **Alb:** Albumin**, PT**: Prothrombin time, **FBS**: Fasting blood sugar, **PPS:** Palliative Performance Scale, **HB**: Hemoglobin, **WBC**: White Blood Cells, **RBCs**: Red Blood Cell Count, **PLT**:platelet count, **S.Cr:** Serum Creatinine, **UA:** Urinalysis, **HDL-Ch**: High-Density Lipoprotein Cholesterol, **LDL-Ch**: Low-Density Lipoprotein Cholesterol

Table (3): Comparison between the studied groups in thyroid functions, TPO-Abs, Tg-Abs, and Resolvin E1 in studied groups:

Variable	Case Group (N=38) Median (Range)	Control Group (N=38) Median (Range)	T-test	p-value
TSH (µIU/ml)	2.62 (1.95–3.05)	2.38 (1.54–2.94)	4.432	0.321
FreeT3 (pg/ml)	2.91 (2.74–3.01)	3.01 (2.0-3.3)	7.417	0.943
FreeT4 (ng/dl)	0.3 (0.01-0.6)	1.0 (0.9-1.36)	2.217	0.945
TT3 (ng/mL)	0.95 (0.87–1.13)	1.04 (0.87–1.13)	2.437	0.497
TT4 (µg/dL)	6.68 (5.78–7.84)	6.84 (5.82–7.68)	4.917	0.767
TPO-Abs (IU/ml)	1300 (9.0-1300)	10.1 (3.5-18.1)	87.5	<0.001*
Tg-Abs (IU/ml)	292 (16-522)	5.3 (2.1-10.5)	87.1	<0.001*
Serum Resolvin E1 (pg/ml)	25.09 (15.43–34.33)	38.51 (20.76–51.76)	40.5	<0.001*

TSH: Thyroid Stimulating Hormone**, T3:** Triiodothyronine, **T4**: Thyroxine, **TT3**: Total Triiodothyronine, **TT4:** Thyroxine Test, **TPO**-Abs: Thyroid Peroxidase Antibody, **Tg-Abs**: Thyroglobulin Antibody

Table (4): Correlation between Serum resolvin E1 levels with age, thyroid function tests and anti-thyroid antibodies in the case group:-

Variable	Serum resolvin E1 levels		
	R	p-value	Sig.
Age (Years)	0.08	>0.05	NS
TSH (µIU/ml)	0.6	>0.05	NS
FreeT3 (pg/ml)	0.7	>0.05	NS
Free T4 (ng/dl)	0.8	>0.05	NS
TPO- Abs (IU/ml)	- 0.6	0.02*	S
Tg-Abs (IU/ml)	- 0.5	0.03*	S

S: significant, NS: not significant, R: Pearson's correlation
TSH: Thyroid Stimulating Hormone, T3: Triiodothyronine, T4: Thyroxine, TPO-Abs: Thyroid Peroxidase Antibody, Tg-Abs: Thyroglobulin Antibody

Table (5): Correlation between Serum resolvin E1 levels with age and thyroid function tests and anti-thyroid antibodies in control group

Variable	Serum resolvin E1 levels		
	R	p-value	Sig.
Age(Years)	0.004	>0.05	NS
TSH(µIU/ml)	0.01	>0.05	NS
Free T3(pg/ml)	0.007	>0.05	NS
Free T4(ng/dl)	0.04	>0.05	NS
TPO-Abs (IU/ml)	-0.3	0.03*	S
Tg-Abs (IU/ml)	-0.4	0.04*	S

S: significant, **NS**: not significant**, R:** Pearson's correlation
TSH: Thyroid Stimulating Hormone, **T3**: Triiodothyronine, **T4:** Thyroxine, **TPO-Abs:** Thyroid Peroxidase Antibody, **Tg-Abs:** Thyroglobulin Antibody

Table 1: Logistic regression analysis to evaluate relationships between RVE1 and increasing TPOAb levels (n=76)

	Univariate			Multivariate		
	OR	(95% CI)	P value	OR	(95% CI)	P value
Age	1.54	(٢.47–٣.43)	**0.002***	1	(0.93–2.38)	0.678
Sex	1.18	(١٠.80–12.22)	**0.016***	1.34	(1.47–3.27)	0.147
BMI	0.33	(١.60–٢.59)	0.765	0.8	(1.49–2.13)	0.797
TSH (µIU/ml)	8.45	(٠.01–٠.60)	0.280	5.93	(0.26–2.36)	0.796
FreeT3 (pg/ml)	0.37	(0.30–3.67)	0.168	0.15	(1.09–3.12)	0.116
Free T4 (ng/dl)	1	(0.80–2.52)	0.654	1.16	(0.22–2.26)	0.754
RVE1	1.01	(١.58–٢.42)	**0.007***	1.01	(1.31–3.47)	**0.006***
Tg-Abs (IU/ml)	1.11	(1.31–3.47)	**<0.001***	1.13	(1.81–4.33)	**0.003***
TT3	3.46	(1.81–4.33)	0.195	1.42	(1.47–3.53)	0.809
TT4	1.12	(1.47–3.53)	0.178	0.16	(4.01–8.17)	0.126
LDL	0.97	(1.09–2.70)	0.061	0.97	(3.30–6.63)	0.222

BMI: Body Mass Index, **TSH**: Thyroid Stimulating Hormone, **T3:** Triiodothyronine, **T4**: Thyroxine, **RVE1**: Resolvin E1, **Tg-Abs:** Thyroglobulin Antibody, **TT3**: Total Triiodothyronine, **TT4:** Thyroxine Test, **LDL:** Low-Density Lipoprotein

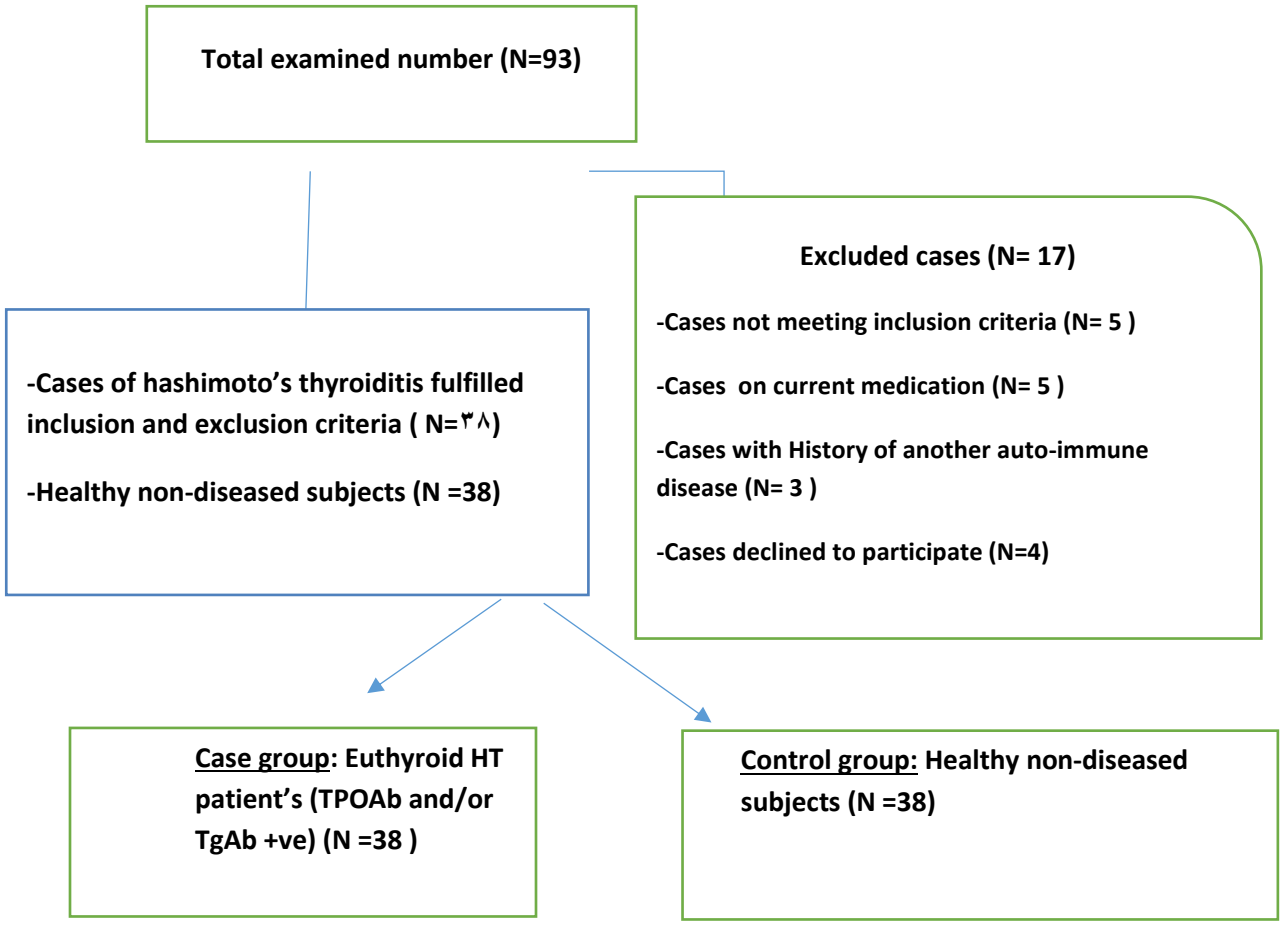

Figure 1: Flow Chart for the recruited cases

DISCUSSION

HT is distinguished by increasing levels of thyroid-specific antibodies, mainly TPOAbs and TgAbs, which indicate the severity of autoimmune thyroid destruction. Cases with HT have a high probability of primary hypothyroidism progression [1].

This study aimed to identify the role of RVE1 in protecting the thyroid gland against increased levels of TPO-Ab & TgAb in patients with HT.

This case-control study was conducted at the Endocrinology unit and clinic, Internal Medicine Department, Zagazig University Hospitals. The estimated sample size was 76 subjects,38 in each group. Case Group (N=38): euthyroid HT patients (TPOAb and/or TgAb +ve). Control Group(N=38): healthy non-diseased subjects.

The second study investigates serum RVE1 values in HT patients and their significance. Regarding the demographic data in our study, there was no substantial variance between the groups respecting demographic data ($p>0.05$).

Moreover, reports by Erdogan et al. [7,8] and Ates et al. [9] investigated HT newly diagnosed cases compared with healthy control subjects, and they reported that there was no substantial variance between the groups concerning demographic data with high female incidence.

The laboratory data in the current study showed no substantial variance between the groups regarding liver function tests.

In addition to our study, Song et al. [10], in their study of 57 individuals, 30 subjects were diagnosed with HT, and 27 age- and sex-matched healthy control individuals reported that no statistically significant differences in liver function tests, PPS, or FBS between studied groups.

Basil and Levy [11] reported different results: that autoimmune thyroid conditions, such as HT, significantly affect liver function and increase the risk of liver inflammation and dysfunction.

The variations between the above report and the current study may be due to the small sample size and differences in the type of patients in our study;

patients were euthyroidism, while in the other study, patients were hypothyroidism.

Regarding the CBC of studied groups in the current study, no substantial variance between the groups.

In addition to our study, Song et al. [10] reported no substantial variance in CBC between groups.

Gilroy et al. [5] reported no statistically significant differences in CBC between thyroiditis and control patients.

Regarding the renal function tests in the current study, no substantial variance between the groups regarding renal function testsMoreover, in their study, Song et al. [10] in their study reported no statistically significant differences in renal function tests between the groups.

Also, Tillmann et al. [12] reported that severe hypothyroidism due to Hashimoto's thyroiditis is associated with an abnormal estimated glomerular filtration rate

The variations between the above studies and the current report may be due to differences in the type of patients in our study; patients were patients associated with acute or chronic illness acute or chronic illness while in the other study, cases with HT and renal disorders were involved.

Regarding the lipid profile in the current study, there was no substantial variance between the groups concerning in lipid profile. In addition to our study, Song et al. [10] in their study reported that no statistically significant differences in lipid profiles between the studied groups

Despite the study of Dundas [13], thyroiditis has been linked with lipid abnormalities, which are defined by standard or slightly higher total cholesterol concentrations, elevated LDL, and decreased HDL.

The relationship between hypothyroidism and lipid-related conditions was first proposed in the 1960s when hypothyroidism was diagnosed through symptoms and signs, as well as serum cholesterol tests, rather than serum thyroid-stimulating hormone (TSH) and thyroxine (T4). In rare situations, elevated serum cholesterol levels were considered an indication of "pre myxoedema" in lack of symptoms of hypothyroidism [14].

The variations between the above study and the current study may be due to the small sample size and differences in the type of patients as in our study; patients were euthyroidism while in the other study, patients were hypothyroidism.

Regarding thyroid functions in studied groups in the present study, no substantial variance was detected between the groups. Also, Song et al. [10] reported no statistically significant differences in thyroid function tests between the groups. Additionally, Peng et al. [15] revealed no substantial variance between the groups concerning free T4 and T3.

Our findings disagreed with previous reports, which detected substantial variance between the HT group and control group concerning thyroid function tests [7–9, 16–18].

This variance between these studies and the present findings can be attributed to the fact that previous studies included hypothyroid cases, and due to the small sample size, those patients affected the results.

Regarding TPO-Abs and Tg-Abs in the studied groups in the present study, there was a highly substantial variance between the groups concerning TPOAbs and TgAbs, with higher Anti—TPO and TgAbs values in the case group.

Also, Song et al. [10] reported that their study showed highly statistically significant differences in increased Anti-TPO and Tg-Abs levels in the case group.

Our findings were also agreed upon by Erdogan et al. [7,8], Han et al. [17], Ates et al. [9], and Xue et al. [18], who reported substantial variance between subclinical, overt, and control groups.

Concerning serum RVE1 values, there was a highly substantial variance between the groups concerning serum RVE1 levels that increased levels in the control group.

In addition to our study, Song et al. reported a highly substantial variance between the groups concerning serum RVE1 levels that are elevated in healthy individuals.

In the current investigation, serum RVE1 concentrations were considerably reduced in HT cases than in HCs. We hypothesized that this discrepancy could imply that HT is linked with inflammatory resolution impairment. RVE1 is a marker of inflammatory resolution abnormalities in other disorders, such as periodontitis, cardiovascular disease, and type 2 diabetes mellitus [19].

Abnormalities of clearance enhance the possibility of autoimmune disorders. Although anti-inflammatory medicines can alleviate the symptoms of autoimmune disorders, they can't heal the condition and are often useless in most individuals. As a result, the combination of anti-inflammatory and pro-resolution actions may be a more effective therapeutic technique. Furthermore, the pro-resolution processes do not raise the body's susceptibility to infection [20].

Regarding the correlation between Serum resolvin E1 levels with age and thyroid function tests and anti-

thyroid Abs in the control group, RVE1 values were inversely associated with TgAb concentrations in the control group. Moreover, multivariate regression analysis showed that age, sex, TgAbs, and RVE1 were significant predictors for increasing TPOAb values in HT cases. In univariate regression analysis, Tg-Abs and RVE1 were significant predictors for increasing TPOAb levels in HT cases.

In addition to our study, Song et al. [10] studied the relationship between RVE1 concentrations and thyroid AAbs. They determined that RVE1 values were associated inversely with TgAb values. As TgAb levels rose, RVE1 content decreased. Furthermore, RVE1 was adversely linked with TgAb.

Investigations demonstrated a substantial positive relationship between TgAb and clinical symptoms in unmanaged HT cases. Thus, it is hypothesized that RVE1 may function as an inhibitor against increasing TgAb concentrations [10].

The pathophysiology of autoimmune thyroid conditions and periodontitis varies. The first is an autoimmune disease, while the second is an infection-driven condition. However, the two disorders have numerous clinical and immunological features, including apoptosis, AAbs, oxidative stress, and inflammation. Therefore, it is suggested that RVE1 may similarly have a protective impact on HT [21].

Additional long-term investigations are required to validate our concept. In certain additional disorders, RVE1 has been demonstrated to enhance inflammation clearance. RVE1 lowers the responsiveness of the airways and inflammation in asthmatic mice. Furthermore, RVE1 lowers neutrophil infiltration and inflammatory cytokines, inducing pain [22].

The study's strengths include being one of the updated studies to investigate serum resolvin E1 in HT and being the second study worldwide. It's a comparative study between HT patients and healthy people. The investigations inside the lab were carried out by one person. There was a high selectivity of cases, and their samples were collected and stored very carefully.

Limitations of this study include a small sample size (total of 76 subjects); our patients were selected very difficult, as euthyroid HT patients aren't widely available, and most HT patients presented with hypothyroidism, and no prior enough similar studies to give us more information.

Author contribution: All authors contributed to the study. MGH was responsible for selecting the subject, EAE and NIZ were accountable for laboratory revisions and analysis, AAAM was responsible for data collection, statistical analysis, and initial writing, and MGH was responsible for collecting the data of the studied cases and all shared for the formulation of the study design, editing, revision, and preparation of the final manuscript.

CONCLUSIONS

We concluded that HT cases had substantially lower serum RVE1 concentrations. RVE1 may also offer protection against elevated TgAb values. More subjects should be included in the next studies to confirm our results. More studies are required to detect the role of serum RVE1 levels in different stages of other autoimmune diseases. Follow-up of HT cases for a larger period to support the role of serum RVE1 levels on the course of the disease.

Conflict of interest: None.

Financial disclosure: None.

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Figure legend:
Figure 1: Flow Chart for the recruited cases

Citation

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