



Evaluation of Asprosin Hormone in Hypothyroidism Patients

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Abstract

Asprosin was a novel adipokine hormone released by white adipose tissue as the main source. It was activated by fasting and attracted to the liver, which allowed the liver to rapidly release glucose into the bloodstream. When people go on a fast, their blood sugar levels drop, which causes levels of the hormone asprosin to rise. It does this by binding to a G-protein-coupled receptor in the liver known as OR4M1, which in turn activates a cascade that involves the G-protein-cAMP-PKA pathway. Because of this, the glucose that is stored in the liver is released. We anticipate that by investigating the changes that occur in asprosin levels in hypothyroidism patients, we will be able to make a significant addition to the area and fill a gap that has been left unexplored in other research. Eighty patients (women) ranging in age from 25 to 65 were collected from the National Diabetes Center Al-Mustansiriyah University (Iraq) for this study, which was designed as a cross-sectional study to determine the concentrations of serum (asprosin, thyroid hormone T3 T4 TSH, Fasting blood glucose FBG, and lipid profile (Total cholesterol T.Cho, Triglyceride TG, high density lipoprotein HDL, Low density lipoprotein LDL, Very low density lipoprotein VLDL). In the period beginning in December 2021 and continuing until March 2022. This particular study included of 80 females, 40 of whom had hypothyroidism, and 40 healthy females who served as controls. When compared to the control group, the findings of this study indicate that the levels of total cholesterol T.Cho, triglyceride TG, and low-density lipoprotein (LDL) have dramatically increased, whilst the levels of HDL have significantly decreased. A substantial increase in (Fasting blood glucose FBG and Body mass index BMI) the levels was also observed, in contrast to the group that served as the control. In patients with hypothyroidism, the levels of thyroid-stimulating hormone TSH were considerably greater, while

the levels of T3 were significantly lower. The T4 level, however, revealed no significant differences when compared to the control group. In addition, the level of asprosin was found to be high in the hypothyroidism group only in contrast to the control group that participated in this research.

This current study indicates the hormone asprosin could be helpful in early diagnosis in monitoring hypothyroidism patients. hormone asprosin is a marker of glucose homeostasis, so it may be a surrogate novel biomarker for all other traditional biomarkers for the prediction of risk factors of diabetes and thyroid dysfunction

Keywords : Asprosin ,Thyroid Dysfunction, Hypothyroidism, Lipid Profile.

1. Introduction

In humans, thyroid hormones play a role in regulating metabolic functions, development, and growth. Thyroid dysfunction affects various vital activities [1]. Conditions that can be either benign or malignant and that change the structure and function of the thyroid gland are referred to as thyroid diseases. The incidence of thyroid illness is second only to that of diabetes mellitus, and it is estimated to account for between 30 and 40 percent of all endocrine diseases. Thyroid disease is the most frequent kind of endocrine condition [2]. Hypothyroidism affects around 5 percent of the population, with an additional 5 percent of cases going undetected. The majority of patients (99 percent) suffer from primary hypothyroidism. Hashimoto's disease, also known as chronic autoimmune thyroiditis, is the most prevalent cause of thyroid failure in areas where there is an adequate supply of iodine [3]. Hypothyroidism is more common among women than males [4]. Asprosin is a novel glucogenic adipokine. During periods of fasting, this hormone is produced by white adipose (WT) tissue, which is harmful to persons who are insulin resistant, obese, and have diabetes mellitus. Asprosin hormone controls glucose homeostasis, it was discovered in patients with NPS (newborn progeroid syndrome) is a rare hereditary disorder characterized by severe leanness and a lack of appetite, as well as low-calorie intake and low energy expenditure. Additionally, they have areas of their bodies that are under-fat, where cleavage asprosin from the C-terminal of profibrillin (encoded by FBN1) leads to a unique metabolic dysregulation that involves partial lipodystrophy, along with a reduction in plasma insulin while maintaining normal blood sugar levels [5]. Asprosin, once secreted, goes to the liver, where it activates OR4M1, an olfactory G-protein-coupled receptor. It penetrates the blood-brain barrier to trigger appetite-modulating neurons in the hypothalamus via an undiscovered receptor [6]. In contrast, plasma asprosin concentrations in persons who are overweight or obese can be up to four times greater than those of those who have a healthy body mass index (BMI). As a result of this relationship between asprosin and body composition, which is assumed to be generated by the effects of asprosin on hunger, asprosin is a very significant target for managing energy balance and, consequently, illness in persons who are diabetic or obese [7]. Adipokines are a kind of cytokine that is secreted by adipose tissue and have the ability to influence many different biological processes. Insulin action in the body's peripheral tissues (especially the liver and skeletal muscles) is inhibited as a result of this compound's presence, which leads to the development of insulin

resistance. On the other hand, adiponectin improves a person's sensitivity to insulin. It is theorized that adipokines play a crucial role in modifying insulin sensitivity by changing the equilibrium between insulin and its other receptors [8]. Asprosin is not only involved in the metabolism of glucose and lipids, but it also has a role in insulin resistance (IR), obesity, and inflammation. It also plays a part in other conditions connected to metabolic syndromes, such as diabetic retinopathy and polycystic ovarian syndrome (PCOS) [9]. Additionally, asprosin decreases insulin sensitivity in muscle cells by increasing inflammation. This route is responsible for the reduction in insulin sensitivity [10].

2. Materials and Methods

The verbally informed assent was acquired from all participants in the study conducted at the national diabetes center/Al-Mustansiriyah University (Iraq) and the College of Science for Women/University of Baghdad/Iraq. during the period of December 2021 - March 2022. The range of their ages was all the way from 25 to 65 years. Forty individuals have been given a diagnosis of hypothyroidism after consulting with a seasoned medical professional, we selected forty healthy volunteers to serve as healthy controls over the time. In-person interviews were performed with respondents to gather data on their way of life as well as demographic information on the respondents, It is possible to attach the questionnaire form or the nature of the questions in it. To count towards the hypothyroidism group, the majority of those with hypothyroidism were actively managing their condition with medication (levothyroxine) The daily doses varied from 50 to 150 mg .The exclusion criteria were women who have had their thyroid glands surgically removed (thyroidectomy), hyperthyroidism, diabetes mellitus , thyroid cancer, smoking women, and pregnant. The blood sample was collected from the individual after they had fasted for ten to twelve hours . A disposable syringe capable of holding 10 milliliters was used to withdraw 10 milliliters of blood from each patient as well as the control group. The blood was collected and placed of a gel tube. After that, the serum was separated by spinning it for 15 minutes at a speed of 3000 rpm. one milliliter of the patient's serum was analyzed for fasting blood glucose levels and lipid profiles, and 1.5 milliliters of the patient's serum was analyzed for thyroid function (T3, T4, and TSH). The remainder was transferred to an Eppendorf tube before being stored in a deep freezer at a temperature of -20 degrees celsius until it was time to measure the amount of asprosin. by using an enzyme-linked immunoassay sandwich approach with a final fluorescent detection, the function of thyroid hormones was assessed (VIDAS, biomeriux). Also utilized the kit provided by the manufacturer to determine asprosin using enzyme-linked immunoassay (MyBioSource). The kit provided by (Cecil CE1011, Linear)was used to determine (FBG, T. Cho, TG, and HDL) using an enzymatic colorimetric technique.

2.1.An examination of the statistics:

A statistical analysis program called SPSS-25 was used to get the analysis of the data that was wanted. We used the independent sample t-test to compare parameter means between groups, and we used the more general descriptive statistic to get a high-level look at what we found. The p-value was considered statistically significant if it was less than 0.05.

3. Result and Discussion

To the best of our knowledge, this is the first study to investigate whether or not serum asprosin levels are correlated to hypothyroidism. Therefore, our results will contribute to the expanding body of knowledge already established about asprosin .

According to the data in the table, when comparing those with hypothyroidism to control group. the levels were significantly higher in (Asprosin,TSH,BMI,FBG, T.Cho,T.G,LDL,VLDL) in patient with hypothyroidism as compared to control. the levels of T3 significantly higher in control group compared to hypothyroidism patients. The T4 level, however, revealed no significant differences when compared to the control group. Hypothyroidism that gets worse causes a state called hypo-metabolism, which is marked by less energy use, higher cholesterol levels, less lipolysis and gluconeogenesis, and weight gain [11].The results of this study were similar to the ones that Hashim, et al. [12], due to Hypothyroidism that gets worse causes a state called hypo-metabolism, which is marked by less energy use [13] .

Table 1: A comparison of laboratory and demographic factors in the research population.

Test	Hypothyroidism (N= 40) (Mean ±SD)	Control (N=40) (Mean±SD)	P-Value
Asprosin (ng /ml)	9.51± 3.95	2.61 ±1.06	0.001
T3 (nmol/L)	1.3675±0.33490	1.4748±0.39	0.014
T4 (nmol/L)	89.138±21.2075	84.843±14.54	0.248
TSH (uUI / L)	8.34013±10.527417	2.080±0.758	0.012
BMI(Kg/m ²)	30.361±5.7811	23.649 ±1.7881	0.001
FBG (mg/dl)	93.03±9.699	89.93±8.856	0.001
T. Cho (mg/dl)	186.25±45.599	154.40±16.022	0.001
TG (mg/dl)	121.27±68.902	90.10±29.864	0.001
HDL (mg/dl)	46.98±9.261	48.15±5.709	0.003
LDL (mg/dl)	114.98±40.620	87.58±12.068	0.001
VLDL (mg/dl)	24.23±13.628	18.15±6.904	0.001

In the present study, the asprosin levels in women with hypothyroidism are considerably greater than in healthy controls. where the mean±SD of serum asprosin concentration was 9.51± 3.95 ng/ml in sera of women with hypothyroidism and 2.61 ±1.06 ng/ml in sera of the control group .asprosin releases glucose from the liver in fasted state via the OR4M1 receptor[6] . Asprosin is crucial for controlling hunger, glucose metabolism, PCOS, obesity, and IR. Asprosin levels rise in obese people[14] [15] [16] [10] , as well as in people with IR [17] [18] , type1diabetes mellitus [19] , and type2diabetes mellitus [8] .

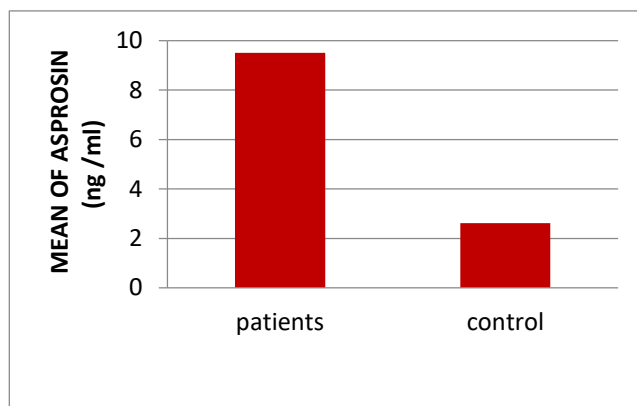


Fig. 1: Average of asprosin for both groups .

The **Table 1** and **Figure 1** show, those with hypothyroidism showed a substantial rise in asprosin. Perhaps this suggests the combined role of both asprosin and hypothyroidism on metabolic rates in the body. The thyroid hormone regulates many aspects of growth and metabolism, and it also helps with the development of many organs [1]. Hypothyroidism lowers basal metabolic rate, oxygen consumption, and lipolysis and may impair adipose tissue action [20]. Furthermore, hypothyroidism lowers the susceptibility of white fat cells to lipolysis and slows the production and metabolism of fatty acids [21].

The BMI was highly a significant difference at (30.361 ± 5.7811) Kg/m² than with the control group (23.649 ± 1.7881) Kg/m². Reduced resting energy expenditure, reduced lipolysis, weight gain, and a higher body mass index are all symptoms of hypothyroidism, which causes the metabolic rate to slow down [22]. Similar findings were found in a research by Du *et al.* [23], on the prevalence of hypothyroidism in people with central obesity. As another piece of evidence, Åsvold BO *et al.* [24], found that hypothyroidism was associated with increased body mass index and obesity prevalence. In the present investigation, women with hypothyroidism who have high BMI had elevated blood asprosin levels. A rise in BMI was a sign that the body had accumulated too much fat. As a result, asprosin secretion rises as a result of the buildup of these lipids [25]. These study are in agreement with studies agree with Ugur *et al.* [26], proposed that asprosin might be a potential biomarker for obesity, at least for adults, because their study results demonstrated a similar increase in asprosin levels with BMI across underweight, normal, overweight, and obese people.

In the group of hypothyroidism, the levels of TC, TG, LDL, and VLDL all increased, whereas the levels of HDL significantly decreased. all were compared with one another and with the control group. Insufficient thyroid hormone production causes hypothyroidism, a common endocrine condition that has a profound impact on lipid synthesis, mobilization, and metabolism [27]. The current findings are consistent with those of Alsalmi *et al.* [28], who showed substantially higher TC, LDL, VLDL, and TG levels in hypothyroidism patients as compared to control group and In other hand hypothyroidism patients, HDL levels were lower than in the control group. Furthermore, the findings of the current investigation contradicted those of Aati *et al.* [27], who showed that the HDL value in hypothyroid individuals was normal.

Gaining weight is one of the signs and symptoms of hypothyroidism. This has a direct correlation with an increase in the total amount of fat mass found in the body. White adipose tissue is the primary location of asprosin secretion in the body [29]. Obesity is associated with an abnormally high level of glucose release from the liver, which is stimulated by asprosin [30]. As a direct consequence of this, its levels are significantly greater in those who are overweight or obese [31]. Therefore, this explains why there was an increase in asprosin in individuals with hypothyroidism since the patients had a high body mass index.

4. Conclusions: hormone asprosin could be helpful early diagnosis in monitoring hypothyroidism patients. hormone asprosin is a marker of glucose homeostasis, so it may be surrogate novel biomarkers for all other traditional biomarkers for prediction of risk factors of diabetes and thyroid dysfunction

Ethical approval :All procedures used in this research followed guidelines set out by the Ministry of Health in Iraq and the 1964 Declaration of Helsinki or were otherwise authorized by the Committee of the University of Baghdad's College of Science for Women. All people who took part in the study gave their informed consent before taking part.

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