Nat. Volatiles & Essent. Oils, 2024;11(2):50-56

Evaluation of Betatrophin Hormone in Patients With Type 2 Diabetes

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Abstract

Background: Diabetes mellitus Type 2 (DMT2) is a chronic metabolic disorder characterized by high blood glucose level due to insulin resistance, which in turn reduces the secretion of insulin hormone relatively . Such metabolic disorders often result in failure of pancreatic beta cells function and their lack of differentiation and thus lack of insulin secretion. Betatrophin hormone (B.H.) is a protein hormone consisting of 198 amino acids. B.H. is considered one of the newly discovered hormones, as many studies have confirmed and demonstrated the relationship between obesity and diabetes and B.H. because the B.H. has several important metabolic roles.

Materials and methods: The current study involved selection 25 individuals of healthy group (first group) and individuals of newly DMT2 group (second group), age of all individuals > 40 of both genders. For all individuals were measured Ins.H., c-peptide, RBS HbA1c and B.H. levels in serum and whole blood. The statistical analysis method was t-test to explain the clinical significant value when compare between 2 groups.

Results: This study results reveals the significant elevation of the c-peptide, RBS, HbA1c and B.H. level in second group compared with first group. In study, the t-test used by mean ± standard deviation (SD) to compare between groups.

Conclusion: The results of the current study summarize that the level of B.H. increases at the onset of DMT2, and this increase is an attempt by the body to enhance the mass of pancreatic beta cells to regulate and enhance the secretion of insulin.

Key words : Diabetes mellitus Type 2 (DMT2), Betatrophin hormone (B.H.), Insulin resistance (IR).

Introduction

Diabetes mellitus Type 2 (DMT2) is a chronic genetic disorder that affects people over the age of 40 years in most cases. The common cause of this disorder is the resistance of the body's cells to the insulin hormone that secreted by the beta cells of the pancreas, a condition called insulin resistance (IR), so the body's response to

insulin becomes low or non-existent, which leads to an increase in the level of glucose in the blood (1). The presence of IR condition in the body can provide feedback that leads to a reduce the secretion of insulin hormone in the body. On the other hand, the many patients with DMT2 suffering from metabolic disorders associated with the disease, such as hyperlipidemia, hypertension and others. The DMT2 patients also suffer from many pathological complications, including neuropathy, nephropathy and others. The most famous symptoms and signs associated with DMT2 are polydipsia, fatigue, poly-urea, vision problems at night and others (2).

Betatrophin hormone (B.H.) is a protein hormone consisting of 198 amino acids, where the gene responsible for encoding it is located on chromosome 19p13. 2 in the hepatocytes. The most famous stimulants for the production of B.H. in the body are irisin, caloric intake, insulin, thyroid hormones, and others stimulus (3). B.H. is considered one of the newly discovered hormones, as many studies have confirmed and demonstrated the relationship between obesity and diabetes and B.H. because the B.H. has several important metabolic roles, the most important of which is its role in promoting the proliferation of pancreatic beta cells, regulating triglyceride levels and others. However, its precise physiological role is still unclear at present. In this research, we summarize the current findings regarding B.H. and their implications (4).
This study aims to evaluation and demonstrate the importance and role of B.H. in regulating serum glucose levels in newly diagnosis DMT2 patients.

Experimental section

Design of the study

Current study was depended on selection of the study individuals then classify them into first and second individuals groups :-
***First group:** involved 25 individuals males and females were age > 40 years, healthy persons as control group.
***Second group :** involved 25 individuals males and females were age > 40 years, who were newly diagnosed with DMT2.

The 2 groups individuals diagnosed newly DMT2 patients or control depended on the American Diabetes Association Releases 2023 conditions and characteristics of the signs, patient history, symptoms and clinical and laboratory examinations (5).

Ethics of the study

At this study, the groups individuals and study samples were collected in May 2024 at Iraq / Baghdad / Al-Yarmouk Teaching Hospital. The all individuals consent was obtained orally to be included in the present study, this to achieve scientific research

ethics. The all study details occurred after the 2013 Helsinki Declaration on the Ethics of Scientific Research.

Collect samples and measurements

After the study individuals were identified and diagnosed, their blood samples were collected divided it into :-

-The first portion of blood samples were left in the water bath for 5 minutes to prepare them for the separation process using a centrifuge to obtain the serum samples. The serum samples used to measurement of RBS, Ins.H, C-peptide and B.H. levels.

-The second portion of blood samples were treated with EDTA tube to preserved whole blood samples. The whole blood used to measurement of HbA1c percent.

These all samples were used to measure several biochemical parameters according to scientific measurement methods and kits from reputable companies according to the following table, see table 1.

Table 1 The kits details of biochemical markers

Biochemical marker	Principle test	Company name for the kit	Lot Number
Random blood sugar (RBS)	Spectrophotometer	SPINREACT	MDBSIS46-E - 03/05/17
Insulin hormone (Ins.H.)	The enzyme-linked immunosorbent assay (ELISA)	ABCAM	ab278123
C-peptide	Solid phase ELISA	IBL International GMBH	RE53011
HbA1c	Chromatographic assay	Dx gen	C1301a
B.H.	quantitative sandwich enzyme-linked immunosorbent assay(ELISA)	AvisceraBioscience	SK00528-02

Statistical analysis: The statistical method T-test was used in this study to compared the two groups using previous biomarkers that show in table 1. The T-test method is used mean and standard deviation (SD) (mean $\pm$ SD) for biomarker in the comparison between groups. To obtain significant value of biomarkers, this method depend on p-value must be less than 0.05.At present study used version 18 of SPSS program (2022) (6).

Results

Our study explained that there are differences values consider as clinical significant between the biomarkers when compared the groups first group (healthy group) and

second group (newly DMT2 group). At this study used the T-test method to compare between the groups. The differences were as follows :-

*An increase in the levels of RBS, C-peptide, HbA1c and B.H. for the second group compared to the first group.

*The level of Ins.H. not effected after compared second group for first group.

See table 2 and figure 1 , 2 & 3 .

Table 2 Comparison between healthy group and newly DMT2 group according to various biomarkers

Biochemical parameters	First group (healthy group) (No.25) Mean ± SD	Second group (newly DMT2 group) (No.25) Mean ± SD	p-value
RBS (mg/dl)	96.4 ± 18.1	207.4 ± 10.6	0.001*
Ins.H. (µIU/ml)	58.3 ± 2.5	64.1 ± 8.9	0.05
C-peptide (ng/ml)	3.72 ± 1.3	5.1 ± 2.2	0.001*
HbA1c (%)	6.1 ± 0.4	9.03 ± 1.4	0.001*
B.H. (pg/ml)	306.5 ± 14.6	627 ± 24.7	0.001*

* P-value less than 0.05 (Significant value)

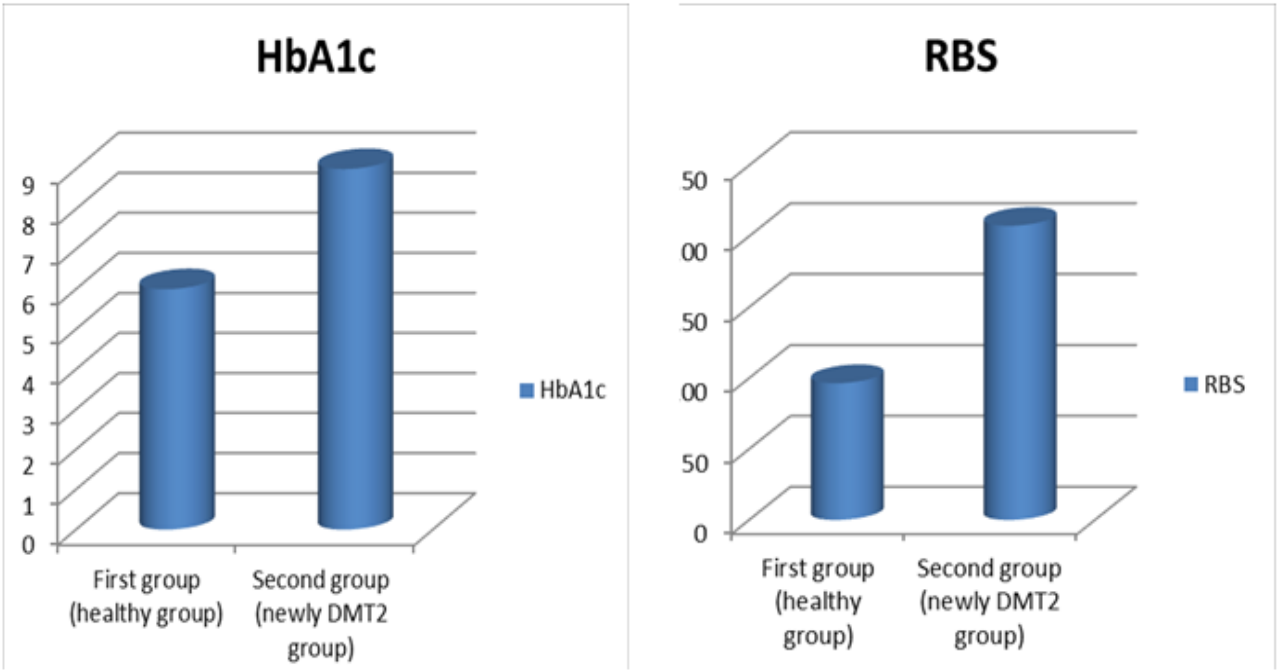

Figure 1 Comparison between healthy group and newly DMT2 group according to HbA1c and RBS biomarkers

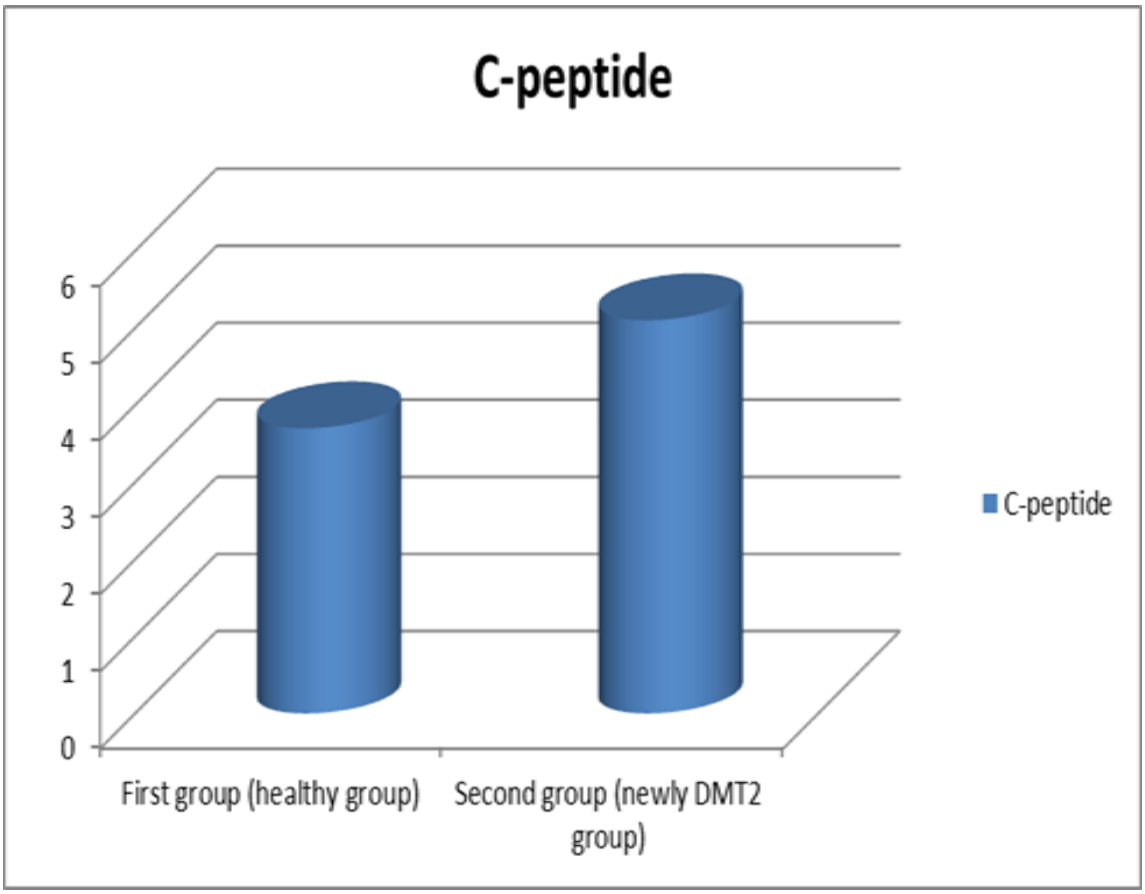

Figure 2 Comparison between healthy group and newly DMT2 group according to C-peptide biomarker

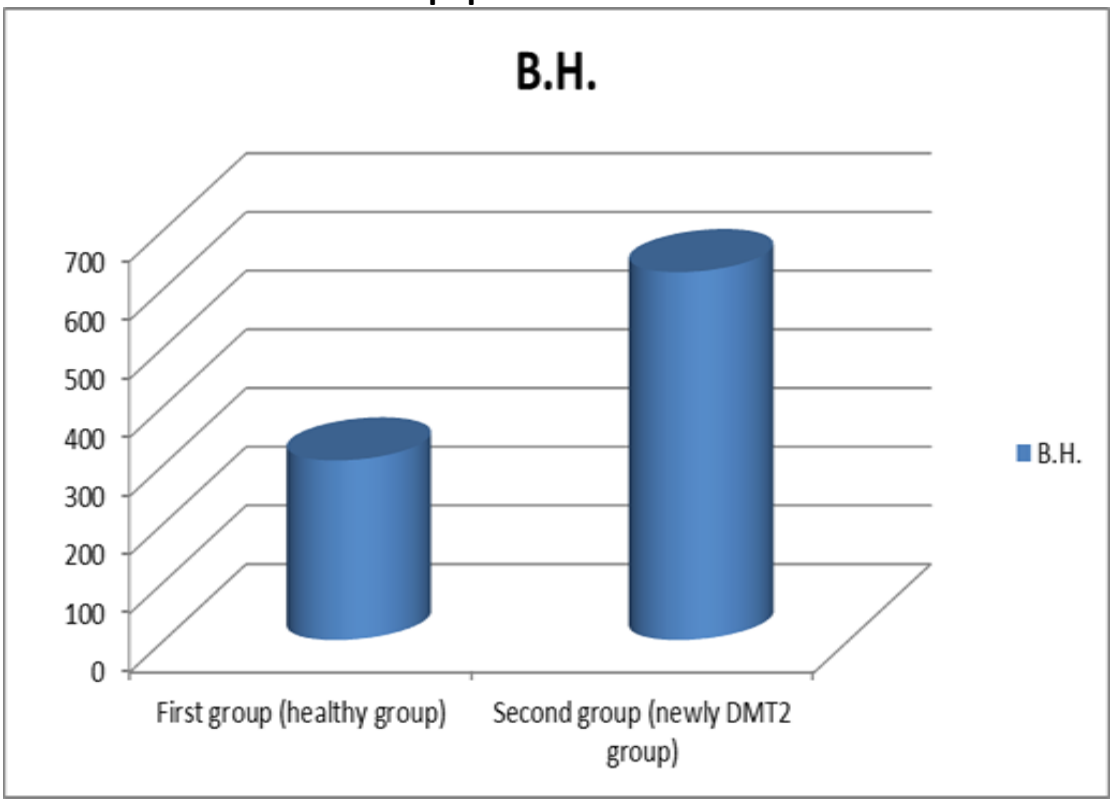

Figure 3 Comparison between healthy group and newly DMT2 group according to B.H. biomarker

Discussion

DMT2 is a chronic metabolic disorder characterized by high blood glucose level due to insulin resistance, which in turn reduces the secretion of insulin hormone relatively (7). Such metabolic disorders often result in failure of pancreatic beta cells function and their lack of differentiation and thus lack of insulin secretion. There was an theory that the liver can produce signals for beta cell proliferation, but the most accepted idea is that the liver-specific depletion of the insulin receptor that produces beta cell hypertrophy by the insulin receptor antagonist (S961) from hepatocytes (8). The S961 insulin resistance model enabled us to determine the high B.H. Our results on B.H. indicate that this hormone can regulate metabolism by increasing insulin production through increasing the mass of beta cells. This in turn confirms the effective role and function of B.H. (9).

B.H. encoding stimulation occurs at the onset of DMT2 disorder because insulin resistance begins to rise. This rise in B.H. is for the purpose of protection, as the body senses the damage that occurs in the pancreatic beta cells, as well as the rise in the level of lipids that accompanies diabetes. The release and increase of B.H. at the beginning of diabetes occurs as an attempt by the body to protect the body from complications of diabetes, as B.H. works as a booster to rebuild damaged pancreatic tissue in order to restore sufficient insulin production for the body, as well as an attempt to regulate fat metabolism and protect the body from high body lipids (10).
The current study results demonstrated elevation of B.H. level in newly DMT2 group compared with control group, this agree with Onalan, E., Bozkurt, A. and et al (2022) that also comfier elevation of B.H. level with DMT2 (11).

Conclusion

The results of the current study summarize that the level of B.H. increases at the onset of DMT2, and this increase is an attempt by the body to enhance the mass of pancreatic beta cells to regulate and enhance the secretion of insulin.

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