



Investigation Of Thyroid Hormones, Diabetic Parameters And Other Anthropometric Parameters In The Sera Of Young Women With 2 Diabetes Mellitus

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Abstract

Diabetes mellitus: are a group of metabolic disease described by constant hyperglycaemia with changes in proteins, lipid, and carbohydrate caused by insulin secretion deficiencies. The purpose of the study is to check the level of anthropometric variables (Age, Body Mass Index, Waist circumference and waist to hip ratio), the variables to study T2DM (FBS, HbA1C, Insulin and HOMA-IR) in another hand, a study of thyroid hormones (T3, T4) and pituitary hormone (TSH) that effect on and effected by T2DM. This study involved collecting (140) samples (80) patients females diagnosed with T2DM and (60) samples of healthy females, all samples were collected from subjects of the same age group $P \leq 0.05$ was used to determine whether the study's findings were significant. The difference in age between the two groups was not significant ($P > 0.05$), while anthropometric characteristics showed highly significant differences ($P < 0.01$) for the other parameters the level of glucose, insulin, HbA1C, HOMA-IR, T4 and TSH were substantially higher ($P < 0.05$) in patients females than in control, T3 level was non-significant ($P > 0.05$) effect. From the collected information it is clear that weight and it is variables have a big effect and conceder as a reason for T2DM, the study of FBS and HbA1C is done to give evidence that the harm that happened in the pancreas makes the body unable to digest glucose. The insulin is secreted in patients more than control and it ensured that the reason made it unable to work is the activity of insulin resistance, the interruption of some autoimmune effect causes the elevation in IR and that makes the insulin unable to do its job in the body and decrease the level of glucose. The level of TSH raised and T4 decreased in T2DM patients and that is back to the fact that the thyroid hormones join in the metabolism of glucose and the dysfunction in the work of this gland effect several ways on T2DM.

1. Introduction

Diabetes mellitus is a common chronic illness that affects individuals all throughout the world, especially the elderly.. Considered a disease caused by an endocrine disorder due to changes in glucose levels (1), occurs when the body becomes insulin-resistance, or if the pancreas is incapable of producing adequate insulin, Diabetes mellitus type 2: is a heterogeneity condition caused by such a glucose rate of production imbalance due to several pathophysiologic abnormalities (increase) and its disposal (decrease) resulting in hyperglycemia (2).

Insulin is defined as a polypeptide hormone that is consist of two chains of an amino acid (A chain contains 21 amino acids; B chain contains 30 amino acids). By disulfide linkage the chains are associated with each other; 51 amino acids those chains contain and with 6,000 molecular weight which is secreted from the pancreas by the β -cells when levels of blood glucose rises (4). The insulin sequence has been structurally classified into four sections containing the signal peptide, C-peptide, There are two types of chains: B-chain and A-chain. Only the B and A chains are joined by three disulfide bonds in the mature insulin molecule, insulin is biosynthetically produced from proinsulin, an insulin precursor that comprises the B and A chains connected to the C-peptide by adjacent pairs of basic residues (5). β -cell is sensitive to the level of blood glucose, a high level of plasma glucose stimulates β -cell to secrete insulin into the blood, after a meal. Insulin resistance when the body cells do not restraint to insulin hormone within its tissues that are implicated in glucose metabolism this term is used. These objective tissues contain the liver (For the fasting state, hepatic glucose production is essential.), muscle (The post-absorptive state is governed by skeletal muscle glucose absorption), the adipose tissue and endocrine pancreas, or decreased sensitivity or response to insulin's metabolic effects, such as glucose elimination via insulin. Reduced sensitivity to insulin's vascular effects, on the other hand, is a key factor in the pathophysiology of insulin resistance. To compensate for the increased plasma glucose the production of insulin in the pancreatic β -cells increases. The concentration of glucose remains at a normal level until the resistance increases and the pancreatic β -cell production of insulin becomes deficient. Eventually, this results in hyperglycemia and T2DM(1).

HbA1C: Glycated hemoglobin is the most widely used analyte for measuring mean glycaemic control. In blood, HbA1c gives proof of a person's normal levels of blood glucose through the past 3 months, that is the anticipated half-life of red blood cells RBCs(6). The HbA1c value was used by the American Diabetes Association (ADA) and the World Health Organization (WHO) to diagnose diabetes mellitus (7).

Thyroid stimulating hormone: A beta chain and an alpha chain glycoprotein hormone generated by the pituitary gland and released into the bloodstream (8). The alpha chain has 92 amino acids, whereas the beta chain contains 112-118 amino acids (9), which are responsible for promoting thyroid hormone synthesis and secretion in addition to regulating the absorption of iodine (10). The primary hormone released by the thyroid's follicular cells (11) called is thyroxine. This hormone is made from thyroid-secreted peptide called "thyroglobulin," which is iodinated to produce "thyroxine" (12). T4 is mostly attached to thyroxine-binding globulin (TBG), transthyretin, and serum albumin (13) in the blood, with just 0.05% of the T4 released being unbound. The active T3 is packaged in T4. The half-life of T4 of roughly a week after it enters the blood circulation system (14). Triiodothyronine 3,5,3'-triiodothyronine (T3) As the bioactive TH, it is 3-8 times more metabolically effective than T4 (15). Enzymatic removal of iodination T4 prohormones in bodily tissues (16) generates the most potent TH, which affects nearly every activity in the body, growth, core temperature and other physiological measures,

2. Experimental Procedure

2.1 Subjects

Samples were carried out in the al - Yarmouk hospital during the period from October 2021 to February 2022. This study involved collecting (140) samples (80) patients females diagnosed with T2DM and (60) samples of healthy females, all samples were collected from subjects of the same age group, The samples ranged in age from(20-35) years old.

2.2 Specimens Collection

A total of 10 mL of venous blood was taken using plastic disposable syringes. In the first step, blood samples were collected after 14 hours of fasting in the morning and left for 30 minutes at room temperature. The serum was separated after coagulation by centrifugation at 704 xg for 20 minutes. Hemolysis samples were discarded, 10 μ L were taken from the serum to measure fasting blood sugar and the rest of the serum was stored and frozen at about -20C ° until analysis.

2.3 Methods

The concentration of insulin was determined by using the commercial kit supplied by DRG-Germany.

The concentration of T3, T4, AND TSH was determined by using the commercial kit supplied from Switzerland.

The concentration of HbA1C was determined by using HPLC D10 bio rad instrument

2.4 Statistical Analysis

The collected results were calculated as a mean and SD. Pearson's correlation coefficient was utilized to estimate the correlation between two continuous variables. P-values of 0.001 and 0.05 were shown as very high significant and significant

3. Results and Discussion:

DM is still one of the major deadly illnesses that affect young women. This study looks at the role of anthropometrics, fasting glucose HbA1c percent, insulin, HOMA, IR, TSH, T3 and T4 in patients with DM in contrast with normal females. The findings are presented as mean SD and are considered significant at $P \leq 0.05$. The average age in the group Non-significant differences ($P > 0.05$) were found between the two groups, although very significant differences ($P < 0.01$) were found for anthropometric characteristics, as shown in Table 1.

Table 1. Age and anthropometric variables.

Parameters	Control (N=60) Mean±SD	Patients (N=80) Mean±SD	p-value
Age (year)	28.22±6.19	29.84±5.84	0.153
BMI (kg.m-2)	27.97±4.69	31.42±4.02	0.0001
Waist circumference (cm)	84.38±8.77	105.10±10.26	0.0001
WHpR	0.88±0.09	0.99±0.09	0.0001

The result obtained in the table above shows that the weight parameters affect patient which have T2DM and that could be because the rise in the BMI causes a defect in the work of enzymes and hormones controlling. The metabolism of glucose in the body and as a result causes T2DM, another fact that the elevated (BMI, WC and WHpR) means that there is a rise in the body fat which made the whole concentration of the bodywork lower the body Fat and this cause a less work on the glucose digestion (17).

According to other studies, having a high BMI is linked to an increased risk of all DM complications. Women had a higher link between being overweight and being diagnosed with a DM problem than men. Being somewhat overweight increased the risk of cardiovascular and renal impairment in women.(18).

As shown in Table 2, the levels of glucose, HbA1C, Insulin, HOMA-IR and TSH in female patients were significantly higher ($P < 0.05$) than in controls. In the other hand, level of T4 was significantly decreased ($p < 0.05$) in the patients as compared with the control. While T3 had no significant effect ($p > 0.05$).

Table 2. Parameters of the study.

Parameters	Control (N=60) Mean±SD	Patients (N=80) Mean±SD	p-value
Fasting glucose (mg/dL)	87.90±7.24	172.81±53.28	0.0001
HbA1c%	4.80±0.34	8.52±1.44	0.0001
Insulin	12.74±4.47	14.97±4.13	0.003
HOMA-IR	2.75±0.97	6.32±2.44	0.0001
TSH	2.84±2.55	17.94±13.04	0.0001*
T3	2.14±0.86	1.18±0.85	0.106
T4	103.03±26.45	28.64±36.20	0.041*

Glucose is one of the energy sources that can be obtained from food or is synthesized inside the body, but high levels of glucose Higher than the normal limits and for long periods followed by other damages that are classified as microvascular complications are represented by diseases(cardiovascular disease, stroke)(19). Hyperglycemia could be happened by a diversity of circumstances, containing physical activity and lifestyle, non-diabetes drugs, disease or

skipping or not taking adequate glucose-lowering drugs in persons with DM (20).

Type 2 diabetes causes the body's cells to become resistant to the effects of insulin as the hormone's receptors become less sensitive to insulin concentrations, resulting in hyperinsulinemia and insulin release disturbances. When the beta cells in the pancreas have a reduced insulin response, they secrete more insulin in response to high blood glucose levels, resulting in hyperinsulinemia (21). Insulin resistance is a condition in which glucose consumption in adipose tissue and skeletal muscle is stimulated and hepatic glucose synthesis is inhibited because insulin is unable to lower plasma glucose levels (22).

These are two of the most common endocrine problems that doctors see are hypothyroidism and diabetes mellitus. Many studies have proven that diabetes and thyroid diseases have a direct impact on each other, and the link between the two has long been recognized (23). To regulate glucose metabolism and pancreatic function, thyroid hormones play a role. Diabetes, on the other hand, has varying effects on thyroid function tests. Understanding diabetes and thyroid disease are linked in an interdependent manner can aid doctors in the proper screening and management of both disorders, as demonstrated in this research. Several pathways influence glucose metabolism via thyroid hormones. Hyperthyroidism has long been recognized to cause high blood sugar levels. Insulin half-life may be reduced due to a faster rate of breakdown and larger release of insulin precursors decreases during hyperthyroidism, Hypothyroidism results in a decreased rate of hepatic glucose synthesis. The formation of meets may be linked to the presence of subclinical hypothyroidism (24).

4. Conclusions

From the result, it is clear that weight and its variables have a big effect and conceder as a reason for T2DM. The elevation in BMI cos wrong work in the enzymes that control the metabolism of glucose and other carbohydrates. The study of FBS and HbA1C is done to give evidence that the harm that happened in the pancreas makes the body unable to digest glucose. The insulin is secreted in patients more than control and it is ensured that the reason made it unable to work is the activity of insulin resistance the interruption of some autoimmune effect causes the elevation in IR and that makes the insulin unable to do its job in the body and decrease the level of glucose. The level of TSH raised and T4 decreased in T2DM patients and that is back to the fact that the thyroid hormones join in the metabolism of glucose and the dysfunction in the work of this gland effect several ways on T2DM.

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Conflict of Interest

The authors have no conflict of interest.

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