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Husam Hadi Jasim
 Department of Chemistry and
 Biochemistry, Faculty of
 Medicine, Fallujah
 University, Iraq

The influence of the circadian rhythm on some biochemical parameters in people with diabetes mellitus

Husam Hadi Jasim

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Abstract

A couple of biochemical and hormonal examinations have been conducted on Iraqis with diabetes, particularly during the daytime hours. Therefore, we aimed to focus on the impact of daily changes in certain biochemical intensifies in the serum of tainted patients and return to the outcomes 11 hours after the fact. The exploration was completed in Baghdad, Iraq from October to December 2021. The review included twenty men divided into two groups: infected patients and healthy individuals. Various biochemical and hormonal analyses were conducted, including diabetes, lipids, testosterone, and HbA1c levels. The study revealed an increase in diabetes in the second measurement at two different times, morning and evening. Additionally, it showed a decrease in testosterone levels with high diabetes, as well as an increase in fat content associated with high diabetes.

Keywords: Circadian rhythm, biochemical parameters, diabetes mellitus

Introduction

As per the World Wellbeing Association (WHO), diabetes mellitus (DM) is a condition of high levels of sugar in the bloodstream ^[1]. High blood glucose can lead to diseases in some organs of the body, which may lead to damage to most vital organs, including the organ. Heart, blood vessels ^[2] and eyes the urinary system ^[3], and the various nerves of the body. Most cases of diabetes are type 2, and this type has two different forms. The first is the inability of beta cells to produce sufficient amounts of insulin. The second is the inability to accept insulin from target cells in the body (T2DM. Type 2 diabetics are usually people with limited physical activity and obesity, which leads to the storage of body fat ^[9]. Global changes in lifestyles include the consumption of foods high in sugars and high-energy fats. Aging populations are the primary drivers of the T2DM scourge. Type 2 diabetes might occur from the combined efforts of many gained and regular bet variables ^[4]. Genetic and natural alterations in circadian temperament are some of the most intriguing factors that have been shown to influence the regularity of T2DM. For instance, T2DM is more normal in the people who work shifts, for example, night and day shifts ^[5]. It has been shown that long periods long openness to intense circadian aggravation advance changes in glucose absorption too.

Glucose homeostasis mechanism

Signals from organs such as the pancreas send nerve signals between the pancreas and the brain, as well as the liver, in the process of controlling the level of glucose in the bloodstream. Increased glucose levels are necessary for insulin discharge from beta cells. Glucose carrier 2 (GLUT2) is a worked with glucose carrier, situated on the outer layer of beta cells, which is liable for glucose take-up from the dissemination ^[6]. During the course of glucose digestion, and glycolysis, when glucose enters the telephones and its level climbs, the level of energy ATP increments. Expanded ATP prompts the hindrance of ATP-touchy K⁺ channels (KATP), which are responsible for engaging upheld rest with practically no updates through the directing of K⁺ particles. This resulted in a reduction in outward K⁺ current, trailed by film depolarization, which came about to the launch of voltage-gated Ca²⁺ channels.

Corresponding Author:
Husam Hadi Jasim
 Department of Chemistry and
 Biochemistry, Faculty of
 Medicine, Fallujah
 University, Iraq

Insulin is delivered while granules convey the chemical wire with the cell film, which is caused by a rise in intracellular calcium levels. Also, the alpha cells located in the islets of Langerhans in the pancreas secrete the hormone glucagon, when there is a decrease in the body's sugar level, which partakes with insulin in keeping up with the glucose level, and. When blood sugar levels increase. Whether as a result of glycogen transformation or the processing of a meal, beta cells in the pancreas islets of Langerhans release an alternate chemical. Insulin causes the liver to convert more glucose into glycogen (a process known as glycogenogenesis) and stimulates approximately 66% of the body's cells (mostly muscle cells and adipose tissue) to retain glucose from the blood via the GLUT4 transporter, lowering glucose levels. When insulin binds to receptors on the cell surface, vesicles containing GLUT4 carriers enter the plasma membrane and circulate together via endocytosis allowing for the simple dispersion of glucose into the cell. When glucose enters the cell, it is phosphorylated to glucose 6-phosphate, which maintains a focal slope till glucose continues to enter the cell [7]. Insulin also sends signals to numerous other physiological systems and is the primary regulator of metabolic regulation in humans. Glucagon advances ketogenesis and lipolysis in the liver. The liver distinguishes

glucose levels in the entry vein and communicates something specific profound (Bend) through vagal transmitters, bringing about more unnoticeable eating and longer postprandial totality [8]. As well as managing G protein-coupled receptor (GPCR) pathways in the Curve, glucagon can pass across the blood-cerebrum boundary (BBB) in creature studies, suggesting that it might act straightforwardly on the CNS. To oversee hunger [9]. Glucose levels during both pressure and hypoglycemia. Following a feast, cells in the gastrointestinal tract discharge a kind of peptide manufactured substances known as incretins, which assume a significant part in overseeing blood glucose and supplement support. Gastric inhibitory peptide (GIP) and glucagon-like peptide 1 (GLP-1) are two critical integrin that lower blood glucose by extending insulin release from pancreatic cells. As well as controlling the speed of help of updates in the body, incretin endeavors to diminish the speed of stomach cleansing. Dipeptidyl peptidase-4 (DPP-4) can repress the activity of GLP-1 and GIP, so DPP-4 inhibitors close by a few sorts of GLP-1 and GIP analogs have been applied in the clinical treatment of T2DM. Regardless, more examination should get a handle on the mending utilization of these solutions for T2DM.

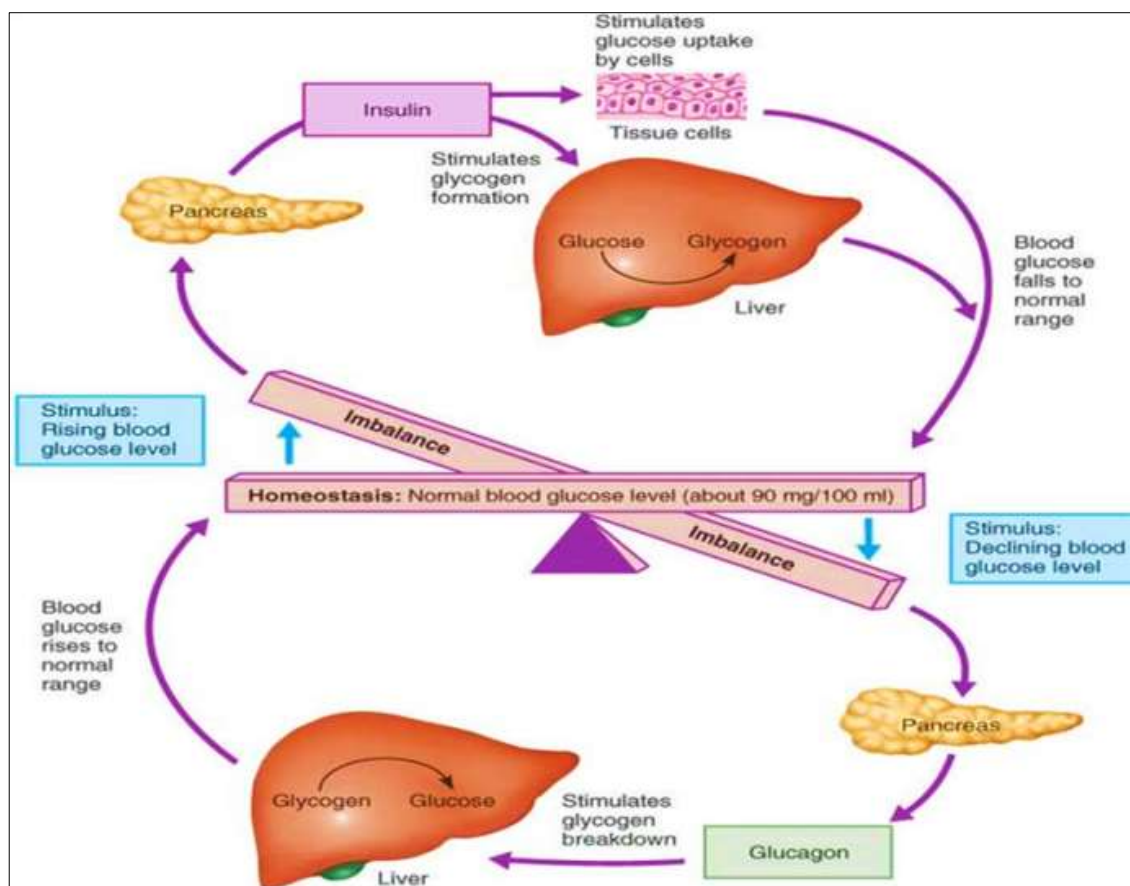


Fig 1: Blood glucose homeostasis is obliged by a grand relationship of correspondences.

Various signs from the pancreas and away from the frontal cortex, liver, muscle, gastrointestinal system, stomach, and fat tissue control blood glucose homeostasis. Glucagon, insulin (close by amylin), pancreatic peptide, and somatostatin are conveyed by cells in the pancreatic islets. Islet cells radiate insulin considering high glucose levels [10].

Administration of testosterone to men with diabetes mellitus

In hypo gonadal men, testosterone replacement enhances sensitivity to insulin. Furthermore, testosterone decreases insulin levels and reactivity in obese men. A research in hypo gonadal men with type 2 diabetes found that testosterone supplementation improves glycemic control, but the preliminary was not dazed [9]. Two examinations on

testosterone supplanting in men with type 2 diabetes and hypogonadism tracked down almost no impact on glycemic control. Notwithstanding, a new report on 24 hypo gonadal men (ten treated with insulin) more than 30 years of age with type 2 diabetes found that testosterone substitution treatment diminished insulin opposition and further developed glucose control. A new report among recently analyzed Men exhibited convincingly that adding testosterone to an eating regimen and workout routine produced much better glycemic control and metabolic condition inversion than diet and exercise alone [11]. In this way, while the logical help for strong impacts of normalizing circling levels of testosterone on the balance of glucose is restricted up to this point, there are reviews to demonstrate that the organization of testosterone might give good consequences for glycemic control and the metabolic continuations of diabetes mellitus.

Testosterone and fats

Low degrees of testosterone in individuals have been displayed to prompt expanded stockpiling of this most risky sort of fat and an expanded frequency of insulin opposition and type 2 diabetes. 1 out of 6 men with type 2 diabetes additionally have low testosterone levels, which can cause diminished moxie and inspiration, loss of bulk and expanded muscle versus fat around the mid-region. In a huge epidemiological review (correspondence study), There gives off an impression of being a relationship to testosterone and cardiovascular gamble factors in sound and non-patients Grown-up men. Serum fatty substances, complete cholesterol, LDL cholesterol, lipoprotein B, fasting and two hours Plasma insulin values and serum HDL cholesterol values were higher It was lower in men with low blood testosterone There are various regular circumstances that can bring about upgrading or keeping an elevated degree of testosterone. Focused energy exercise and strength preparing have been displayed to increment testosterone levels and furthermore lead to enhancements in insulin awareness. Low degrees of vitamin D have been related with low testosterone levels, and review have tracked down much of the time, notwithstanding this case, that high cortisol leads to low cortisol. Testosterone. I Levels. The way that testosterone is a significant consider This distinction in risk profile is obvious from the perceptions In men getting androgen removal treatment For prostate disease, bringing about genuinely serious and A sharp reduction in testosterone in the blood. In these men, there is an expansion in blood cholesterol, LDL cholesterol fatty oils and a reduction in HDL cholesterol [12]. The job of testosterone is additionally affirmed by Constructive outcomes of testosterone organization on Lipid profiles in an investigation of recently analyzed men Diabetes and metabolic condition. These impacts continue after some time as is clear from A, Testosterone in diabetes Investigation of men getting injectable testosterone undecanoate for up to 9.5 years [13].

Erectile dysfunction and diabetes: risk factors and interrelationships

Epidemiological studies indicate that type 1 and type 2 diabetes are associated with an increased risk of erectile dysfunction (ED), which affects a large number of diabetic males globally. 36, 45 in a study related to diabetes, men without diabetes were three times more likely to develop ED

than men without diabetes [14]. Individuals with diabetes who are older and have had diabetes for a longer period are more likely to develop erectile dysfunction. It is not known whether hyperglycemia contributes to the development of erectile dysfunction in men with diabetes. Some observational studies have found a link between poor glycemic control, as measured by elevated levels of glycated haemoglobin (HbA1c), and erectile dysfunction, and the different methodological approaches used in each study may explain, at least in part, these findings inequality. In addition, diabetes is commonly associated with high blood pressure, hyperlipidemia, overweight and obesity, a condition called metabolic syndrome, smoking, sedentary lifestyles, and autonomic neuropathy, all of which are known risk factors for diabetic problems. Microvascular [15] and macrovascular increase the incidence of erectile dysfunction in males. Many common diabetes medications have been used to protect against ED in both the general population and males with diabetes.

Oxidative stress with diabetes

Albeit receptive oxygen species (ROS) are a result of oxygen digestion, they are fundamental for ordinary cell exercises. A very much managed cell reinforcement framework keeps up with ROS levels inside physiological reaches [16]. Yet, the connection between ROS age and cell reinforcement limit causes an expansion in ROS, which causes compound changes in DNA, protein and lipids, prompting cell passing, otherwise called oxidative pressure. Oxidative pressure is firmly connected to various illnesses, including type 2 diabetes. Type 2 diabetes is on the ascent all around the world because of the stoutness pandemic and maturing populaces, and insulin obstruction is a significant connection between these two. It is realized that insulin obstruction is a basic gamble factor for type 2 diabetes and other constant illnesses, like cardiovascular infections and cancers. It is realized that high glucose in diabetics prompts serious entanglements by advancing oxidative pressure in the heart, kidneys and eyes. As of late, [17] oxidative pressure has likewise been proposed to be a reason for insulin obstruction. Patients with type 2 diabetes experience the ill effects of raised oxidative pressure in plasma and tissue. In numerous sickness states hereditary control of cell reinforcement chemicals upholds the hypothesis that oxidative pressure causes insulin opposition. Nonetheless, the lopsided aftereffects of cancer prevention agent treatment on type 2 diabetes bring up the issue of whether oxidative pressure causes insulin obstruction. In this way, we performed tests in creatures and people to decide the capability of oxidative pressure in the improvement of insulin opposition [18].

Vitamins

Vitamin A is an antioxidant that is important for pancreatic growth, as well as maintaining and regulating islet cells. They are engaged with hepatic lipid digestion, adipogenesis, and pancreatic beta cell action. Numerous vegetables and natural products contain carotenoids, which are enzymatically hydrolyzed to retinol, as well as a couple of xanthines. Retinol-restricting protein and transthyretin (transport protein) transport retinol from the liver to fringe tissues, working with its phone take-up by its film receptor STRA6. It essentially affects lipid digestion and insulin responsiveness [19] in both human and creature species.

Utilization of α - β -carotene and lycopene further develops glucose digestion in T2D patients, while vitamin A lack prompts hyperglycemia and loss of pancreatic cell mass. Vitamin A manages neuronal separation, brain tube improvement, and pathogenesis [20]. T2D has been connected to lacks of different B complex nutrients, including B1 (thiamin), B3 (nicotinic corrosive/niacin), B6 (pyridoxine), B7 (biotin), B9 (folic corrosive/folic corrosive), and B12 (cobalamin). It essentially affects lipid digestion and insulin responsiveness in human and creature models. Utilization of α - β -carotene and lycopene further develops glucose digestion in T2D patients, while vitamin A lack prompts hyperglycemia and loss of pancreatic cell mass. Vitamin A manages neuronal separation, brain tube improvement, and pathogenesis [21]. Lack of different B complex nutrients, including B1 (thiamin), B3 (nicotinic corrosive/niacin), B6 (pyridoxine), B7 (biotin), B9 (folic corrosive/folic corrosive), and B12 (cobalamin), are related with T2D. [22] Thiamine lack essentially affects the focal sensory system and heart. Individuals with type 2 diabetes have lower levels of thymine than sound individuals, which might be connected with higher kidney freedom or tissue brokenness brought about by high glucose. Thiamine supplements increment blood glucose levels and reduction urinary egg whites discharge, which might turn around beginning phase diabetic nephropathy. Thiamine diminishes plasma cholesterol and fatty substances in diabetic rodents and improves endothelial capability in patients with type 2 diabetes [23].

Materials and Methods

Time Parameters	Groups	At 7 A.M (At morning)	At 8 P.M (At evening)	LSD
RBS	Control	90.6 \pm 1.2 Bb	123.6 \pm 0.9 Ab	7.5
	Diabetic	167 \pm 3 Ba	247.6 \pm 2.7 Aa	
HbAc1	Control	4.96 \pm 0.13 Ab	4.76 \pm 0.22 Ab	0.87
	Diabetic	8.8 \pm 0.31 Aa	8.7 \pm 0.26 Aa	

Esteems express as mean \pm SE, Number of human per each gathering (10).

The different capital letters allude tremendous contrasts

This study was driven in Al-Zaydan Private Exploration office/Baghdad - Iraq. It was guided from October to December 2021. This study included ten subjects, and the times of all subjects went from 20 to 50 years. They were isolated into two gatherings. Each gathering shared five individuals (10 men). Samples were collected at different times in the morning at 8 a.m. and the second time was at 7 p.m. Samples were collected from a blood sample draw, direct blood was used to measure HbA1c diabetes samples, what's more, plasma was utilized to quantify irregular sugar and lipid tests. All study subjects experience the evil impacts of steady infections like diabetes or Hypertension. Their sickness was confirmed. Around 5 ml of blood was taken from all individuals who took part in this overview. This study utilized different stuff. Gadgets and contraptions: Little VIDAS (bio Mérieux, France (The mean and standard deviation not set in stone for each limit. The Verifiable Pack for the Human sciences (SPSS, Windows 25 adaptation). It was used for quantifiable assessment.

Results

Our study included eighty members. Twenty people are men It was studied in both groups of people with diabetes and normal people Data on age (range 20 to 50 years) and intense stage responding intensifies It is communicated as the mean \pm standard deviation (SD) for the two gatherings in the table Diabetic subjects RBS (3 \pm 167) ng/ml at 7 a.m. While diabetes was measured at 8 pm. The result was (2.7 \pm 247) ng/ml, while the results of the non-infected people on the next morning at 7 a.m. were (1.2 \pm 90).

between times inside one line at ($p \leq 0.05$) the different little letters allude huge contrasts between bunches inside one section for every boundary at ($p \leq 0.05$).

Time Parameters	Groups	At 7 A.M (At morning)	At 8 P.M (At evening)	LSD
Cholestrol	Control	155.8 \pm 3.3 Ab	147 \pm 2.8 Ab	13.5
	Diabetic	210 \pm 5.5 Ba	238 \pm 3.1 Aa	
Triglyceride	Control	80 \pm 5.5 Bb	190 \pm 11.4 Ab	33.5
	Diabetic	181 \pm 3.9 Ba	313 \pm 6.2 Aa	
Testosterone	Control	6.8 \pm 0.17 Aa	5.9 \pm 0.19 Aa	0.86
	Diabetic	4 \pm 0.37 Ab	2.88 \pm 0.18 Bb	

Esteems express as mean \pm SE, Number of human per each gathering (10) the different capital letters allude tremendous contrasts between times inside one line at ($p \leq 0.05$).

The different little letters allude tremendous contrasts between bunches inside one section for each parameter at ($p \leq 0.05$) 8 pm (3 \pm 123) while the study showed that HbA1C in people with diabetes was (0.31 \pm 8.8) while in normal people (0.13 \pm 4.96) ng/ml. The study also showed high lipids in people with diabetes, as the cholesterol result was at 7 am (5.5 \pm 210) while at 8 (pm 3 \pm 238) 1. ng/ml, while in normal people the percentage is normal. The results at 7 (am) were 3.3 \pm 155.8) ng/ml while the results at [8] pm

(2.8 \pm 147) ng/ml, while the percentage of triglycerides in infected people at 7 a.m. was (3.9 \pm 181) ng/ml, while at 8 p.m. (6.2 \pm 313) the percentages were normal in normal people, as they were at 7 am (80 \pm 5.5) ng/ml, while at 8 pm it was 11.4 \pm 190) ng/ml, while testosterone results in people with diabetes at 7 am were (0.37 \pm 4), while at 8 pm they were (0.18 \pm 2.88) ng. /ml, while the level of testosterone in uninfected people in the morning was (0.17 \pm 6.8) ng/ml in the morning, while it was at 7 am 8) pm 0.19 \pm 5.9) ng/ml

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