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Medical Journal of Clinical Trials & Case Studies
ISSN: 2578-4838

Alterations of Glucocorticosteroids Thyroid Hormones Leptin and Endothelins Threat of Cardiovascular Disease in Diabetes

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Case Report
Volume 8 Issue 2
Received Date: February 20, 2024
Published Date: June 04, 2024
DOI: 10.23880/mjccs-16000366

Abstract

Background: The cardiovascular diseases are phenomenon or circumstances that affect the structures as well as function of the heart.

Aim: The level of glucocorticosteroids, thyroid hormones, leptin, and endothelins in cardiovascular subjects was determined in Owerri, Imo state.

Method: A total of 100 subjects within the age 35-65 years were recruited for this study. The study consists of 50 subjects who were diagnosed of cardiac disorders and 50 were apparently healthy individuals who served as controls subjects of the same age bracket. The levels of glucocorticosteroids, thyroid hormones, leptin, and endothelins were analysed using ELISA technique. Data was assessed using SPSS version 20, the mean value with $P< 0.05$ was considered statistically significant.

Results: The result revealed that the levels of glucocorticosteroids, thyroid hormones, leptin, and endothelins in cardiovascular disorder were significantly increased when compared with control subjects.

Conclusion: The increased serum level of glucocorticosteroids, thyroid hormones, leptin, and endothelins in cardiac malfunction subjects may contribute some risk factors in patients with cardiac dysfunction and in people living with diabetes.

Keywords: Glucocorticosteroids; Thyroid Hormones; Leptin; Endothelins; Cardiovascular Disease; Diabetes

Introduction

Patients with diabetes have an increased risk of cardiovascular disease due to endocrine abnormalities. Hyperglycemia is a common feature across a varied set of disorders that collectively make up diabetes. It happens when the blood has an excessive amount of glucose. It is characterized by weight loss and polyuria and can arise when the body becomes resistant to insulin, which transports glucose from the blood to cells [1]. It is a significant contributor to long-term health issues and early mortality. Many lives in Owerri, Nigeria, have been silently claimed by

it. Under physiological circumstances, endocrine hormones have an impact on vascular tone. Diabetes is a result of the interaction of several different hormones. Endocrine problems can then exacerbate cardiovascular disease and cause a pathological increase in diabetes.

Understanding endocrine hormones may help treat diabetes and even cure it completely, which could lower the risk of cardiovascular disease [2]. Globally, the rate of diabetes is rising at a geometric pace. A complicated interdependent interaction characterizes the relationship between these hormone changes and diabetes mellitus. Thyroid gland nodularity may be increased by insulin resistance, which influences the risk of diabetes. Diabetes patients are more likely to have endocrine dysfunctions [3].

The conditions or phenomena known as cardiovascular illnesses have an impact on both the structure and operation of the heart. In Owerri, Nigeria, it is the leading cause of mortality. There are several forms of cardiovascular illness, each with its own set of reasons [4]. These comprise pericarditis, cardiomyopathies, rheumatic heart disease, irregular cardiac rhythms, aortic disease, marfan syndrome, and other vascular illnesses [5]. Depending on the exact ailment, different cardiovascular diseases have different symptoms. Certain illnesses, like type 2 diabetes, may not show any symptoms at all at first [6].

While angina can be indicated by chest pain or pressure, other common symptoms of underlying cardiovascular disorders include shortness of breath, nausea, weakness, pain or discomfort in the arms, left shoulder, elbows, jaw, or back, light-headedness or vertigo, and cold sweats [7].

A high-fat, high-carbohydrate diet, physical inactivity, obesity, sleep apnea, excessive alcohol consumption, radiation therapy, smoking, atherosclerosis or artery blockages, high blood pressure, or hypertension; diabetes; high blood cholesterol, or hyperlipidemia; air pollution; chronic obstructive pulmonary disease; or other reduced lung function are risk factors associated with CVD [8]. Glucocorticosteroids, thyroid hormones, leptin, and endothelins are endocrine hormones that are connected to cardiovascular disorders in one way or another. With the goal of achieving a successful therapeutic response, this study measures these endocrine hormones in cardiovascular disease.

Materials and Methods

Subjects: A total of hundred (100) subjects between the ages thirty five and sixty five were recruited for this study. Fifty (50) were cardiovascular disorder subjects who had been attending cardiology clinic for not less than three months diagnosed of heart disorder consisting of 25 males and 25 females. Fifty (50) were apparently healthy individuals who served as controls subjects of the same age limits and sex who had no record of any other ailment.

Blood collection: Venous blood samples (5ml) were collected aseptically by venipuncture from each of the subjects using a 5ml sterile disposable syringe and needle. The whole blood samples were dispensed into a pre -labeled plain dry specimen container and allowed to clot. The clotted samples were centrifuged at 3000rpm for 5minues to separate and obtain the serum for analysis. Informed consent of the participants was obtained and was conducted in line with the ethical approval of the Hospital.

Biochemical assay: The serum level of glucocorticosteroids, thyroid hormones, leptin, and endothelins were determined by Enzyme Linked Immunosorbent Assay Technique

Statistical analysis

The results were expressed as mean ± standard deviation. The statistical evaluation of data was performed by using independent students.

RESULTS

Parameters	controls Subjects(n=50)	cardiac disorders Subjects (n=50)	p-value 0.05
Glucocorticosteros, (µg/ml)	0.22±0.14	1.50±1.95*	0.001
T4 (µg/ml)	0.24±0.12	0.74±0.16*	0.02
leptin, (mg/ml)	5.17±1.10	9.27±1.67*	0.001
Endothelins (pg/mL)		3.14±0.70	0.003

Table 1: Mean ±SD Values of Serum level of glucocorticosteroids, thyroid hormones, leptin, catecholamines, and endothelins in cardiac Subjects of the Study Population.
*statistically significant compared with control (P<0.05)

Discussion

Atherosclerosis, or the buildup of fatty deposits inside the arteries, and a higher risk of blood clots are typically linked to cardiovascular problems. Additionally, it may be linked to artery damage in the kidneys, eyes, heart, brain, and heart. Cardiovascular disease (CVD) is a primary cause of mortality and disability in Nigeria. However, it may be substantially avoided by adopting a healthy lifestyle [9].

When compared to the control group in this study, there was a substantial rise in the level of glucocorticoids in cardiovascular disease. This is consistent with previous research [10]. Within the class of steroid hormones known as corticosteroids is the class of glucocorticoids. The corticosteroids known as glucocorticoids attach to the glucocorticoid receptor found in nearly all vertebrate animal cells.

Glucocorticoids, are commonly used to treat autoimmune and inflammatory disorders. Most frequently, their mode of action is based on genetic impacts, which can have both positive and negative outcomes. Immunosuppression, muscle atrophy, central obesity, hepatosteatosis, osteoporosis, insulin resistance, hypertension, depression, and sleeplessness are possible outcomes of an increase in glucocorticoids [11].

The hypothalamic-pituitary-adrenal (HPA) axis strictly regulates the production of glucocorticoids because of the potential harm that this rise in these hormones can cause. Corticotrophin-releasing hormone (CRH) is released when the hypothalamus is activated. The anterior pituitary then releases adrenocorticotrophin (ACTH) in response. This subsequently instructs the adrenal gland's cortical layer to release glucocorticoids, which have the ability to affect peripheral tissues [12]. Over time, increased levels of circulating glucocorticoids restrict glucocorticoid release by blocking the hypothalamus's and pituitary's ability to generate more CRH and ACTH, respectively. Consequently, glucocorticoids exhibit a diurnal cycle with peak circulating hormone levels at the start of waking hours and are released in a pulsatile manner.

Similarly, compared to controls, there was a considerable increase in thyroxine hormone levels in cardiovascular disease. This is consistent with other academic publications [13]. Iodine-containing hormone produced by the thyroid gland. Thyroxin helps regulate growth and development and quickens chemical activities within cells. Thyroid problems can be treated with thyroid supplementation, which can also be produced in a lab. Your body's metabolic rate, or how much energy it uses, is regulated by thyroid. It also affects bone health, brain development, muscle and heart function, and digestion. Numerous bodily processes slow down when the thyroid gland produces insufficient amounts of thyroxine, a condition known as hypothyroidism. The primary hormone that the thyroid gland secretes into the bloodstream is called thyroxin. It is essential for brain development, bone maintenance, heart and muscle function, metabolism, and brain development [14]. In fact, thyrotoxicosis is the term used to describe an excess of thyroxine in the bloodstream.

This can be brought on by overindulging in exogenous thyroid hormones, thyroid gland inflammation leading to the release of excess hormones into the bloodstream, hyperthyroidism (overactivity of the thyroid gland), which can be brought on by benign tumors like Plummer's adenoma or toxic nodular goitre, or autoimmune diseases like Graves' disease. Intolerance to heat, excessive perspiration, weight loss, increased hunger, increased bowel movements, abnormal menstrual cycle, rapid or irregular pulse, palpitations, fatigue, irritability, tremor, and hair thinning/loss are among the main signs of thyrotoxicosis [15].

In addition, compared to controls, there is a considerable rise in leptin and endothelins in cardiovascular diseases. The primary source of the protein hormone leptin is adipocytes. Its main function is probably to control the long-term energy balance. Leptin levels affect hunger, satiety, and motivated actions focused on preserving energy stores. They are one of the primary indicators of energy status. Your body produces leptin, a hormone, in adipose tissue to help you sustain your ideal weight over time. It accomplishes this by controlling appetite by bringing on the sense of fullness, or satiety. The primary role of leptin is to assist in maintaining a long-term equilibrium between your body's energy expenditure and food intake.

In order to keep your body from producing a hunger response when it doesn't require energy (calories), leptin helps inhibit appetite and control energy balance.

Peptides called endothelins have actions and receptors in a variety of bodily organs. Blood arteries constrict and blood pressure rises when endothelin is present. Although other systems generally maintain the endothelins in balance, an overabundance of these molecules can lead to hypertension, heart disease, and possibly other illnesses. Hence, diseases that harm the heart may result from elevated endothelin levels [16].

Conclusion

Glucocorticosteroids, thyroid hormones, leptin, and endothelins were found to be elevated in the serum in

individuals with cardiac dysfunction. These levels may be associated with an increased risk of developing cardiac dysfunction and diabetes.

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