



Study of role of Cortisol in body function WSR to Physiology – A Literature Review.

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Abstract:

Though widely known as the body's stress hormone, Cortisol has a variety of effects on different functions throughout the body. It is the main glucocorticoid released from the zona fasciculata layer of the adrenal cortex. The hypothalamus-pituitary-adrenal axis regulates both production and secretion of cortisol. Loss of regulation can lead to cortisol excess disorders, such as Cushing syndrome, or cortical insufficiency, such as Addison disease.

So this article is focusing on Cortisol hormone which is essential for life.

Key Words: Cortisol.

INTRODUCTION:

Cortisol is a steroid hormone, in the glucocorticoid class of hormones. When used as a medication, it is known as hydrocortisone.

It is produced in many animals, mainly by the *zona fasciculata* of the adrenal cortex in the adrenal gland. It is produced in other tissues in lower quantities. It is released with a diurnal cycle and its release is increased in response to stress and low blood-glucose concentration. It functions to increase blood sugar through gluconeogenesis, to suppress the immune system, and to aid in the metabolism of fat, protein,

and carbohydrates. It also decreases bone formation. Many of these functions are carried out by cortisol binding to glucocorticoid or mineralocorticoid receptors inside the cell, which then bind to DNA to impact gene expression.¹

AIMS AND OBJECTIVES:

1. To explain in detail of Cortisol hormone wsr to Physiology.
2. To highlight the importance/significance of Cortisol in body function wsr to Physiology.

MATERIALS AND METHODS:⁴

Cortisol - Cortisol is a steroid hormone that helps the body respond to stress. It's sometimes called the "stress hormone." That's because levels of cortisol in the body spike during times of high stress. Steroid hormones are a category of hormones synthesized naturally in the body from cholesterol. Collectively, they carry out a wide range of functions in the body.²

Function:

Cortisol plays a crucial role in regulating glucose metabolism and promotes gluconeogenesis (glucose synthesis) and glycogenesis (glycogen synthesis) in the liver and glycogenolysis (breakdown of glycogen) in skeletal muscle. It also increases blood glucose levels by reducing glucose uptake in muscle and adipose tissue, decreasing protein synthesis, and increasing the breakdown of fats into fatty acids. Cortisol is also responsible for releasing amino acids from muscle, providing a substrate for gluconeogenesis. Its impact is complex and diverse.³

Glucocorticoid receptors are present in almost all tissues in the body. Therefore, cortisol is able to affect nearly every organ system- Nervous, Immune, Cardiovascular, Respiratory, Reproductive, Musculoskeletal, Integumentary.

Cortisol has many functions in the human body, such as mediating the stress response, regulating metabolism, the inflammatory response, and immune function.⁴

DISCUSSION:

Cortisol levels reach their lowest levels late at night — usually around midnight. From there, levels begin to rise. Cortisol reaches its highest level in the body early in the morning, peaking around 9 a.m., before beginning to decline again throughout the later day.

The pattern can change or become altered if people work irregular shifts or sleep a lot during the day. Diseases, including adrenal gland disorders, that affect the production or use of cortisol also can disrupt the normal pattern.⁵

Disease & disorder:

Adrenal gland disorders may arise when the adrenal glands produce too much or too little cortisol. In Cushing's syndrome, there's too much cortisol production, while adrenal insufficiency (AI) is marked by too little cortisol production.⁶

Some medical disorders are related to abnormal cortisol production, such as:

- Primary hypercortisolism (Cushing's syndrome): excessive levels of cortisol
 - Secondary hypercortisolism (pituitary tumor resulting in Cushing's disease, pseudo-Cushing's syndrome)
- Primary hypocortisolism (Addison's disease, Nelson's syndrome): insufficient levels of cortisol
 - Secondary hypocortisolism (pituitary tumor, Sheehan's syndrome)

Pharmacology:

It functions to increase blood sugar through gluconeogenesis, to suppress the immune system, and to aid in the metabolism of fat, protein, and carbohydrates.⁷

It has two primary actions: it stimulates gluconeogenesis—the breakdown of protein and fat to provide metabolites that can be converted to glucose in the liver—and it activates antistress and anti-inflammatory pathways.⁸

Conclusion:

1. Cortisol plays a crucial role in regulating glucose metabolism and promotes gluconeogenesis (glucose synthesis) and glycogenesis (glycogen synthesis) in the liver and glycogenolysis (breakdown of glycogen) in skeletal muscle.
2. Cortisol is a hormone made by the two adrenal glands (one is located on each kidney) and it is essential for life. Cortisol helps to maintain blood pressure, immune function and the body's anti-inflammatory processes.

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