

Stress! Can Interfere with Endocrine System

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Abstract:- Stress is a state of homeostasis that is usually stimulated by an adverse force that is being established due to a physiological response. This chapter explains in detail the stress response system that are being regulated by the adrenal gland hormones when stimulated. Most of the hormonal changes are increased due to stress which includes growth hormone, prolactin, and glucocorticosteroids.

An Increase in stress levels may lead to different changes in the body of humans or other animals which may lead to an imbalance in body features. Stress systems are being discussed in this section even though it is not separate organ because they play a vital role in regulating different body systems.

I. INTRODUCTION

In this present generation, a lot of people suffer from stress or mental problems that occur due to various issues that an individual faces in his /her daily life. These are caused by pressure, or any worries regarding work, and huge responsibilities. Major changes that occur in the workplace, home, or life matters. The Common cause of stress in the present generation usually occurs in teens aged 16-24, that arises due to discrimination in work area or school colleges among peers and friends, or when they experience hatred and comparison between people.

- The term stress was first incorporated by the scientist named **HANS SELYE**
- Stress is defined as the state of worry or any situation that is caused at different times, these are natural responses that are caused by threats.
- These tell how our human body reacts to the outside environment when under pressure
- The major causes that occur due to stress are severe headaches, physical and mental pain, and less sleep. The best way to overcome stress is to practice yoga, exercises and consult a psychologist for help.

II. TYPES OF STRESS

- Acute stress
- Chronic stress
- Eustress

➤ **ACUTE STRESS:** These are short time mental and symptoms of physical stress, some of the events that occur

due to challenges, or while preparing for an exam, or during any competitions and situations.

- **CHRONIC STRESS:** These occur when a body suffers stress or pressure for a long time. These occur due to frequent worry about work or finance, these can cause huge damage to the body.
- **EUSTRESS:** These are positive stress that encourages a person to take a risk and leave their comfort zone. These are temporary nervousness than intense anxiety.

III. LEVELS OF STRESS



Fig 1 Levels of Stress

- **Fight or flight:** These are the stress alarms that occur inside the body. Some of them are increased release of stress hormones, increase in heart rate, blood pressure, fear, and anxiety.
- This may also cause short time memory loss.
- **Damage control:** When the body feels stressed, after the shock from the fight and flight response, the body begins to keep itself normal. In this phase, the Anti-inflammatory hormones are secreted to control the inflammation.
- **Recovery:** In this, phase the body starts recovering back into the original self after the damages are being done in the body due to increased stress levels. These are also called as exhaustion phase, where the body feels usually less energy than normal.
- **Adaptation:** The body starts adapting to the surrounding environment and makes adjustments.
- **Burnout:** These are defined as the loss of meaning in our work, which may usually lead to mental, and physical exhaustion and leads to different health problems.

Now let us discuss the main topic, that occurs within our body on stimulation of all the stress hormones.

IV. CONTROLLING CORTISOL LEVELS IN THE BODY

Cortisol levels in our body are not constant, they keep changing according to our sleep cycle or diurnal rhythm. When we wake up our body is full of energy, so there will be an automatic increase in the cortisol level, accordingly at night time while our body is tired because of work the cortisol levels decrease automatically. High levels of cortisol can disturb our sleep. These cortisol are secreted by the adrenal gland that is located on the top of the kidneys.

The connection between the pituitary gland base, hypothalamus region, and the adrenal gland is called as hypothalamus-pituitary-adrenal axis or HPA Axis. The hormones released are corticotrophin-releasing hormone and adrenocorticotropic hormone (ACTH).

V. ENDOCRINE SYSTEM: THE STRESS RESPONSE

The endocrine system comprises various glands and functions. These secrete different hormones and they are used to coordinate the body's metabolism, stress, mood, injury response, and reproduction. Some of the endocrine glands are the hypothalamus, pineal body, pituitary gland, thyroid gland & parathyroid gland, thymus gland, Adrenal gland, pancreas and testis, and ovary.

During the stress response, the major endocrine gland is the Adrenal gland. These are suprarenal glands that are present above the kidney, each adrenal gland has two parts: outer cortex and inner medulla. Various regions of the cortex produce different hormones like mineralocorticoids, glucocorticoids, and gonadocorticoids.

Cortisol is a glucocorticoid that is released during stress response and plays an important role. Medulla produces hormones like Epinephrine/Adrenaline and Norepinephrine/Noradrenaline. Epinephrine acts as a part of the flight/fight response.

VI. THE PROCESS

STRESS RESPONSE SYSTEM

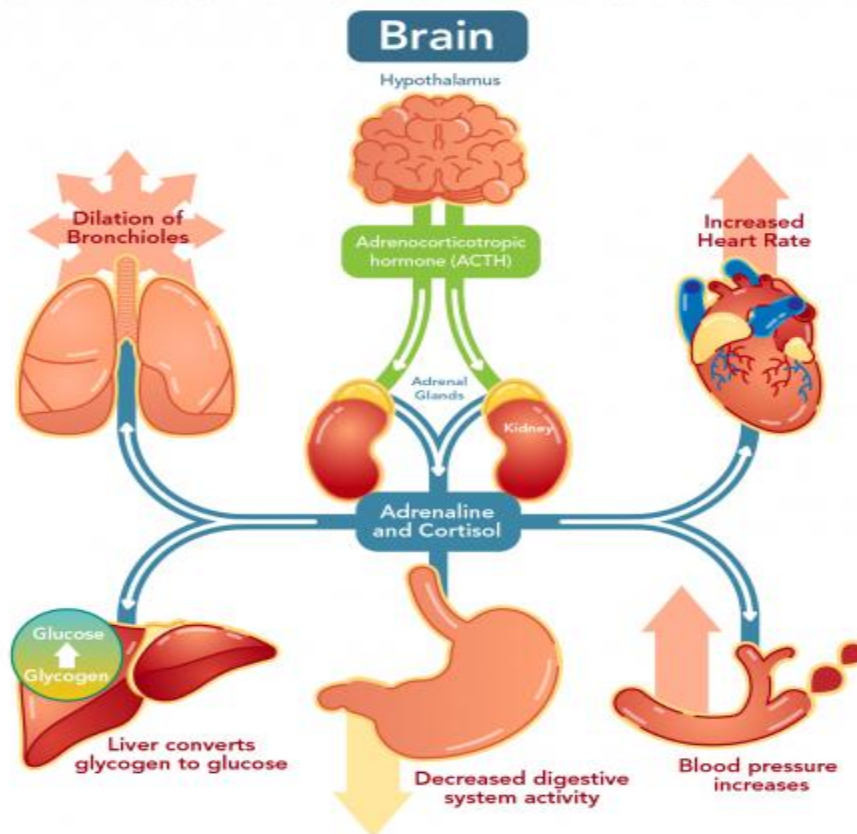


Fig 2 Stress Response System

Hypothalamus is the important element of the pituitary gland, that activates the sympathetic nervous system. It is initiated by the message in the pituitary gland, this pituitary gland sends messages to the adrenal gland that is present on top of the kidney to secrete epinephrine, and cortisol (stress hormones). During this response, the breath, heart rate, and blood pressure increase. With the help of cortisol, the liver breaks molecules and releases glucose into the blood, which gives energy to the body. This is usually done for a flight or fight response that helps the body to escape from stressful situations.

A. Effects of Stress on Different Systems of the Body

➤ *Musculoskeletal System*

Muscles that are present in the body tense up when they are stressed. When stress occurs, the body releases tension. This chronic stress stimulates the muscles and always keeps them on guard. Tension in the body may cause headaches, migraine, and pain in the shoulders, arms, and neck. Muscle atrophy arises due to chronic stress.

➤ *Respiratory System*

Air comes through the nose and goes through the larynx and the air is passed through the trachea into the lungs, and reaches the bronchioles. These transfer oxygen circulation. Stress either results in rapid breathing or shortness of breath. Acute stress caused by the death of loved ones can cause an asthma attack in many people and also may cause a panic attack in a few. If the person already has a breathing problem like asthma, then stress can increase the difficulty for the patient to breathe. During stress, the heart starts pumping faster and causing the blood vessels to constrict and increasing the consumption of oxygen to the muscles, which raises the blood pressure to perform its action. Therefore the heart muscles start to work for a long time. This may result in a heart stroke or heart attack.

➤ *Cardiovascular System*

Heart and blood vessels comprise the CVS System. These provide oxygen to organs in the body and these element activity involves in stress response. Acute stress like deadlines, traffic, and urgent meetings increases heart contractions which in turn increases the heart rate that causes the release of stress hormones like adrenaline, adrenaline, and cortisol. Fight or flight response occurs when there is an elevation of blood pressure and heart dilation. The Body returns to a normal state after stress. Great risk occurs at stress on heart diseases.

➤ *Endocrine System:*

During uncontrollable situations adrenal gland acts as a primary stress response. This results in the production of steroid hormones called glucocorticoids, which involves cortisol which is called a stress hormone. During stress, increase cortisol results in a decline in health.

➤ *Reproductive System:*

Chronic stress affects the production of testosterone in males.

- There is decreased sexual activity
- There is a decline in sex drive
- Erectile dysfunction may happen
- Impotence may be seen in males.

In Females,

- Menstruation is affected by stress
- Irregular menstrual cycle happens for most of the females
- Periods may be painful
- Decrease in conceive rate
- Premenstrual syndrome

B. Effect of Excess Hormone(Cortisol) In The Body

For some, people there is always an increase in cortisol levels, which may take some time to return to normal. When a person is under constant pressure or stress then the cortisol levels remain high. Examples may be people working in stressful places, domestic abuse, toxic work environment, people who are under sexual, verbal harassment, and person who have experienced painful memories, and, Post-traumatic stress disorder(PTSD).

When there is a high level of cortisol in the body or for one or two days, it is ok for the body to manage, but if it persists all the body systems start getting affected.

C. Cortisol Disorders

➤ *Cushing Syndrome*

This happens when there is too much amount of cortisol in the body. There are two types ;

- Exogenous
- Endogenous

Cushing syndrome is the result of a high intake of corticosteroids that are taken from medications such as prednisolone.

➤ *SYMPTOMS:*

- Weight gain
- Stretch marks
- Muscle weakness
- Growth of facial hair

➤ *Addisons Disease*

These are the opposite of Cushing's syndrome. They are autoimmune disorders where the adrenal glands do not produce enough cortisol.

➤ *SYMPTOMS:*

- Abdominal pain
- Dehydration
- Nausea, Vomiting, Diarrhea

- Salty food craving
- Fatigue

D. Strategies For Management Of Stress

- Eating a healthy diet, and following regular exercise
- Getting plenty of sleep
- Practising yoga, meditation, massage
- Listening to music, dance, and journal
- Healthy friendships, time with family& friends
- Having a sense of humor, watching comedy shows,movies
- Volunteering in social service
- Seeking professional counseling

E. Things To Avoid

Using tobacco

Drugs must be avoided during stress, and consuming excess food may cause abnormalities in the Human body.

F. Adverse Affects

- High blood pressure
- Heart disease
- Obesity
- Diabetes

➤ DANGERS OF CHRONIC STRESS

- Depression
- Anxiety
- Hyperthyroidism
- Cancer
- Liver cirrhosis
- Sexual problems
- Lung disease
- Heart disease

VII. CONCLUSION

Stress systems are being stimulated due to various reasons and the external environment. They are usually recognized due to the Neurohormonal behavior/Psychomotor issues that occur in humans. The endocrine responses are responsible for the changes that occur in concentration of the blood components or proteins that are related to stress. Various other studies are being conducted to find out informations regarding stress and people suffering from stress are asked to consult for domestic help and various preventive measures are followed as mentioned.

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