CHAPTER – 1

STRESS

1.1 Introduction

In this chapter, we plan to introduce systematically the concept of stress and then to present a discussion on the evolution of this concept step by step. Stress is defined as a bodily or mental tension resulting from factors that tend to alter an existent equilibrium. Stress is an active process that involves an action on the system that threatens its equilibrium. It is assumed that the tension may cause harm unless some process of compensation reduces the disequilibrium to a baseline level or the cause is removed in [1]. It follows that a stressor is a stimulus event that challenges the integrity, or health, of the body and a stress response is the body’s compensatory reaction to that challenge.

The term "stress" was first used by the endocrinologist Hans Selye in the 1930s to identify physiological responses in laboratory animals. He later broadened and popularized the concept to include the perceptions and responses of humans trying to adapt to the challenges of everyday life.

In Selye's terminology, "stress" refers to the reaction of the organism, and "stressor" to the perceived threat. Stress in certain circumstances may be experienced positively. Eustress, for example, can be an adaptive response
prompting the activation of internal resources to meet challenges and achieve goals.

Modern life is full of hassles, deadlines, frustrations, and demands. For many people, stress is so common place that it has become a way of life. Stress isn’t always bad. In small doses, it can help us to perform under pressure and motivate to do our best. But when we are constantly running in emergency mode, our mind and body pay the price. If we frequently find ourselves feeling frazzled and overwhelmed, it’s time to take action to bring our nervous system back into balance. We can protect ourselves by learning how to recognize the signs and symptoms of stress and taking steps to reduce its harmful effects.

Stress is a feeling that's created when we react to particular events. It's the body's way of rising to a challenge and preparing to meet a tough situation with focus, strength, stamina, and heightened alertness in [62].

![Figure 1.1.1. The HPA axis](image-url)
The HPA axis reacts to stress by causing the hypothalamus to secrete CRH, which stimulates the pituitary to secrete ACTH, which then stimulates the adrenal cortices to secrete glucocorticoids, mainly cortisol in humans. Glucocorticoid feedback at the hippocampal and hypothalamic levels is a well recognized mechanism for inhibiting stress induced HPA-axis activity. In addition, other non-glucocorticoid mechanisms of inhibition exist. The neurotransmitter GABA is a well-established inhibitor of ACTH release. Thus the HPA axis seems to be under tonic inhibition, partly mediated through GABA\(_A\) receptors.

![Central Nervous System Image](image)

**Figure 1.1.2. Central Nervous System**
The events that provoke stress are called **stressors**, and they cover a whole range of situations—everything from outright physical danger to making a class presentation or taking a semester's worth of our toughest subject.

The human body responds to stressors by activating the nervous system and specific hormones. The hypothalamus signals the **adrenal glands** to produce more of the hormones adrenaline and cortisol and release them into the bloodstream. These hormones speed up heart rate, breathing rate, blood pressure, and metabolism in [70]. Blood vessels open wider to let more blood flow to large muscle groups, putting our muscles on alert. The liver releases some of its stored glucose to increase the body's energy and sweat is produced to cool the body. All of these physical changes prepare a person to react quickly and effectively to handle the pressure of the moment.

This natural reaction is known as the **stress response**. Working properly, the body's stress response enhances a person's ability to perform well under pressure. But the stress response can also cause problems when it overreacts or fails to turn off and reset itself properly.
1.2 Types of Stressors

1.2.1 Good Stress and Bad Stress

The stress response (also called the **fight or flight response**) is critical during emergency situations, such as when a driver has to slam on the brakes to avoid an accident. It can also be activated in a milder form at a time when the pressure's on but there's no actual danger - like stepping up to take the foul shot that could win the game, getting ready to go to a big dance, or sitting down for a final exam. A little of this stress can help keep you on your toes, ready to rise to a challenge and the nervous system quickly returns to its normal state, standing by to respond again when needed. But stress doesn't always happen in response to things that are immediate or that are over quickly. On going or long-term events, like coping with a divorce or moving to a new neighborhood or school, can cause stress, too.
Long-term stressful situations can produce a lasting, low-level stress that's hard on people. The nervous system senses continued pressure and may remain slightly activated and continue to pump out extra stress hormones over an extended period. This can wear out the body's reserves, leave a person feeling depleted or overwhelmed, weaken the body's immune system, and cause other problems.

1.3 The Different types of Stressors

There are four main types of stress that people experience.

1.3.1 Eustress

Eustress is a type of short-term stress that provides immediate strength. Eustress arises at points of increased physical activity, enthusiasm, and creativity. Eustress is a positive stress that arises when motivation and inspiration are needed. A gymnast experiences eustress before a competition.

1.3.2 Distress

Distress is a negative stress brought about by constant readjustments or alterations in a routine. Distress creates feelings of discomfort and unfamiliarity. There are two types of distress. Acute stress is an intense stress that arrives and disappears quickly. Chronic stress is a prolonged stress that exists for weeks, months, or even years. Someone who is constantly relocating or changing jobs may experience distress in [79].
1.3.3 *Hyperstress*

Hyperstress occurs when an individual is pushed beyond what he or she can handle. Hyperstress results from being overloaded or overworked. When someone is hyperstressed, even little things can trigger a strong emotional response. A wall street trader is likely to experience hyperstress.

1.3.4 *Hypostress*

Hypostress is the opposite of hyperstress. Hypostress occurs when an individual is bored or unchallenged. People who experience hypostress are often restless and uninspired. A factory worker who performs repetitive tasks might experience hypostress.

Our ability to perform increases up to a certain level of stress arousal. This is the healthy tension or eustress. But if this stress continues uncontrolled and a fatigue point is reached, any further stress arousal will take the performance level down, ultimately leading to exhaustion, ill-health and, finally breakdown.
1.4 The Body’s Stress Response

Here are ways in which some key body systems react.

1. **NERVOUS SYSTEM**
   When stressed — physically or psychologically — the body suddenly shifts its energy resources to fighting off the perceived threat. In what is known as the “fight or flight” response, the sympathetic nervous system signals the adrenal glands to release adrenaline and cortisol. These hormones make the heart beat faster, raise blood pressure, change the digestive process and boost glucose levels in the bloodstream. Once the crisis passes, body systems usually return to normal.

2. **MUSCULOSKELETAL SYSTEM**
   Under stress, muscles tense up. The contraction of muscles for extended periods can trigger tension headaches, migraines and various musculoskeletal conditions.

3. **RESPIRATORY SYSTEM**
   Stress can make you breathe harder and cause rapid breathing — or hyperventilation — which can bring on panic attacks in some people.

4. **CARDIOVASCULAR SYSTEM**
   Acute stress — stress that is momentary, such as being stuck in traffic — causes an increase in heart rate and stronger contractions of the heart muscle. Blood vessels that direct blood to the large muscles and to the heart dilate, increasing the amount of blood pumped to these parts of the body. Repeated episodes of acute stress can cause inflammation in the coronary arteries, thought to lead to heart attack.

5. **ENDOCRINE SYSTEM**
   Adrenal glands
   When the body is stressed, the brain sends signals from the hypothalamus, causing the adrenal cortex to produce cortisol and the adrenal medulla to produce epinephrine — sometimes called the “stress hormones.”
   Liver
   When cortisol and epinephrine are released, the liver produces more glucose, a blood sugar that would give you the energy for “fight or flight” in an emergency.

6. **GASTROINTESTINAL SYSTEM**
   Esophagus
   Stress may prompt you to eat much more or much less than you usually do. If you eat more or different foods or increase your use of tobacco or alcohol, you may experience heartburn, or acid reflux.
   Stomach
   Your stomach can react with “butterflies” or even nausea or pain. You may vomit if the stress is severe enough.
   Bowels
   Stress can affect digestion and which nutrients your intestines absorb. It can also affect how quickly food moves through your body. You may find that you have either diarrhea or constipation.

7. **REPRODUCTIVE SYSTEM**
   In men, excess amounts of cortisol produced under stress, can affect the normal functioning of the reproductive system.
   Chronic stress can impair testosterone and sperm production and cause impotence.
   In women stress can cause absent or irregular menstrual cycles or more painful periods. It can also reduce sexual desire.

These physical changes increase strength and stamina, speed reaction time, and enhance focus — preparing to either fight or flee from the danger at hand.
Stress is a normal physical response to events that make we feel threatened or upset our balance in some way. When we sense danger -whether it’s real or imagined- the body's defenses kick into high gear in a rapid, automatic process known as the “fight-or-flight” reaction, or the stress response.

The stress response is the body’s way of protecting us. When working properly, it help its stay focused, energetic, and alert. In emergency situations, stress can save our life -giving you extra strength to defend yourself, for example, or spurring to slam on the brakes to avoid an accident.

But beyond a certain point, stress stops being helpful and starts causing major damage to the health, mood, productivity, relationships, and quality of life in [95]. Keep in mind that the signs and symptoms of stress can also be caused by other psychological and medical problems.

1.5 Stress Management

Stress management encompasses techniques intended to equip a person with effective coping mechanisms for dealing with psychological stress, with stress defined as a person's physiological response to an internal or external stimulus that triggers the fight-or-flight response. Stress management is effective when a person utilizes strategies to cope with or alter stressful situations. There are several ways of coping with stress, such as controlling the source of stress or learning to set limits and to say "No" to some demands that bosses or family members may make.
In addition psychotherapy is used to deal with the effects of stress. The research literature now shows that most forms of psychotherapy are effective in that they produce outcomes that are better than those obtained with untreated or minimally treated control groups. In recent years, a series of techniques have been developed that are designed to deal directly with the effects of stress without considering early childhood or family variables, personality variables or ego defenses.

The best stress management techniques are those that are easy to use, quick to learn and quick to implement. We can use them to manage our own stress levels or teach them to help others manage theirs. Quiet time, meditation, prayer, reading, yoga, and relaxation techniques can help in stress management.

Elimination of drug use and no more than moderate alcohol use are important for the successful management of stress. Talking about problems can help to reduce conflict and express feelings. Incorporate some type of exercise into each day and eating a healthful diet rich in fruits, vegetables, and whole grains can prevent stress. Stress management techniques help us control of our stress and be a healthier, happier and more pleasant person to be around in [107].
1.6 Psychosocial Effects

Schematic depiction of the relationship between deployment to a war zone and adverse health and psychosocial effects. Deployment to a war zone results in exposure to numerous stressors that can lead to acute and chronic stress responses that in turn can have potential long-term consequences, including adverse health and psychosocial effects. The nature of the stress response and the adverse health and psychosocial effects can be modified by a number of risk and protective factors in [128].
1.7 Yoga and Stress

Yoga minimizes impact of stress on the individual. Yoga is not a miracle cure that can free a person from all stress, but it can help to minimize it. Yoga practice that focuses only on physical remedies is limited, for it deals only with physiology and not psychology.

Yogic science believes that the regular practice of asanas and pranayama strengthens the nervous system and the nerves control the unconscious mind, and that when the nervous system is strong, a person faces stressful situations more positively.

The practice of asanas and pranayama helps to integrate the body, breath, mind, and intellect. Slow, effortless exhalation during practice of an asana brings serenity to the body cells, relaxes the facial muscles, and releases all tension from the organs of perception: the eyes, ears, nose, tongue, and skin. Asanas improve blood flow to all the cells of the body, revitalizing the nerve cells. This flow strengthens the nervous system and its capacity for enduring stress.