CHAPTER – 1

STRESS IN PSYCHONEUROENDOCRINOLOGY

1.1 Introduction

In this chapter, we plans 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. 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.

According to psychological theories stress is determined by “the balance between the perceived demands from the environment and the individual’s resources to meet these demands” [31, 70]. The greater the challenge and less the compensation, the greater the tension and the potential for damage to the system. The state of stress is ended when the tension is removed by compensating for the stressor and eventually eliminating it. The demand is greater, the necessary compensation is greater.
The difference between the demand and our ability to compensate determines a much more severe stress state that is potentially damaging which is illustrated in Fig: 1.1.1. The three stages of stress show arrows of different lengths that go from the compensation to the demand imposed by the environment [143]. The stress results from the demand and that compensatory capability is a function of the distance that has to be covered in reducing the threat to zero. The greater the demand and the less ability to reduce it, the greater will be our state of stress.

![Fig: 1.1.1 States of stress](image)

The states of stress in Fig: 1.1.1 is illustrated by the amount of demand posed by the environment and the amount of compensation required keeping the system within homeostatic limits. The length of the line connecting the demand and the compensation indicates the extent to which the system must use energy and compensatory resources to balance the demand. The greater this
is, the greater the amount of stress on the system. The stress will be maintained until the threat is eliminated. Failure to eliminate the threat may result in damage to the system. Stress is a biological term which refers to the consequences of the failure of a human or animal body to respond appropriately to emotional or physical threats to the organism, whether actual or imagined. It includes a state of alarm and adrenaline production, short-term resistance as a coping mechanism, and exhaustion. It refers to the inability of a human or animal body to respond. Common stress symptoms include irritability, muscular tension, inability to concentrate and a variety of physical reactions, such as headaches and accelerated heart rate.

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.

It seems that in 1956, Selye [113] has been instrumental in stimulating a reversal of the engineering convention for the language of stress. He refers to
the “noxious” stimulating condition which produces stress reaction as the “stressor”, while the state of the animal itself, the reaction, is called stress. It might be noted in passing that sometimes Selye uses the term “stress” to refer to the initial impact of the stressor on the tissues (the alarm state), sometimes to the adaptive mechanism whose function it is to restore homeostasis, and sometimes to the wear and tear, damage, or disease consequences of prolonged homeostasis processes. There are at least three meanings here to the term “stress”, even though it always refers to the state or reaction of the animal’s tissue systems to the stressor or noxious stimulus.

Hans Selye proposed a distinction between the cause of bodily disturbance and its effect. He referred to the external cause or stimulus as a stressor and to the state of bodily disequilibrium as stress. In a paper published in 1980, Selye [111] summarized his views in the following way:

1. Stress is nonspecific, although each stressor has both specific effects (sweating during heat) and nonspecific effects (adrenal enlargement, development of ulcers).
2. A Stressor is whatever produces these nonspecific effects.
3. Psychological events can produce the same stress responses as physical stressors.
4. Some stressors produce good stress, or eustress, and other produce bad stress.
5. Stress is always a matter of degree.
6. Stress in human can be moderated by various treatment techniques.

The term “Stress” originated in the field of engineering, although in literary and colloquial usage it also means a special force or emphasis exerted on some word or idea while speaking or writing. To the engineer it means any external force directed at some physical object. The result of this force is strain, the temporary or permanent alteration in the structure of the object. Many writers in psychology and physiology have adopted this engineering convention, stress being the external agent or stimulus and strain being the resultant effect. This usage is probably appealing because of the ease with which it seems to fit into the concept of homeostasis, a concept widely used in psychology and physiology. Since the work of Cannon [19], homeostasis models have played a large role in physiology.

From the homeostasis point of view, a stress is some stimulus condition that results in disequilibrium in the system and produces a dynamic kind of strain, that is, changes in the system against which mechanisms of equilibrium are activated. Stress is an important concept in life sciences and contributes to the development of heart and cerebrovascular disease, hypertension, peptic ulcer, inflammatory bowel diseases, absenteeism from work, negative emotional reactions and reduced work productivity. **Prolonged stress or very intense stress can also influence performance and may impair attention**
and memory [82], and can contribute to human errors and accidents. During times of stress (negative and positive) both body and mind is affected.

The stress process involves three related components:

(1) **Stressor**: an environment condition or psychosocial factor that results in stress.

(2) **Strain**: a short term physiological, psychological factor that results in stress.

(3) **Modifier**: an individual characteristic such as a coping style or social support that may reduce or increase the individual’s stress response.

### 1.2 Types of Stressor

Stressors can be categorized as follows.

1. **Physicochemical stressor**: External environment represented by ‘nature’. For example, change in climate and weather. Pollution, disaster and chemical substances are also in this category.

2. **Social Stressor**: The ‘social Environment’. For example, changes in economic condition, international position of a country are them. On individual level, life environment such as work, home, school, human relationship etc.

3. **Biological stressor**: The internal environment. Some change occurred inside our body. Sickness and injury would be the example for this. Others include fatigue, lack in sleeping time, time rag etc.
1.3 Physiological stress

The physiological effects of stress are measures taken by the body to tackle the stressful condition. The physiological effects of stress occur as a result of certain functional adjustment such as diversion of blood from less vital to more vital organs, increase in the respiratory rate to get more oxygen from the atmosphere, formation of more glucose from non carbohydrate substances, that occur in the body which are meant for the body to handle stress efficiently. If this physiological stress is not there, then the person would succumb to the hostility of the environment.

The basis of the physiological stress model has its roots in the work by Cannon and Selye [18, 112]. Cannon [18] developed the “fight – flight” concept, which linked emotional expressions such as fear to physiological changes in the periphery. He emphasized the activation of the sympathetic adrenal medullary (SAM) system in such situations, irrespective of whether the emergency reaction was ‘fight’ or ‘flight’. The markers of the fight-flight response are the Catecholamine, epinephrine and nor epinephrine, which
increases when stress appears, and other physiological indicators associated with the autonomic nervous system. Thus, the SAM system is activated when the individual is challenged in the control of the environment, or is threatened, and this defense reaction prepares the body for battle or escape [69]. Epinephrine is also related to mental effort and cognitive performance. Under normal levels of stress increased epinephrine is associated with improved performance [69].

Selye [112] proposed the General Adoption syndrome (GAS) [80], which reflects the physiological changes following adverse emotional stimulation, i.e., prolonged stress. The Hypothalamic – pituitary – Adrenal (HPA) axis has a central part of Selye’s formulation of GAS. Activation of the HPA system is associated with release of the hormones ACTH and Cortisol. The activation of HPA and SAM leads to increased arousal, which means that energy is mobilized and aids the body in the physical “fight or flight”. Energy is mobilized to the brain, heart and to the muscles, and at the same time the blood flow to the muscles and gastro – intestinal system is reduced. The energy mobilization, resulting in an elevated blood concentration of glucose and free fatty lipids, is given priority and anabolism is down regulated. The anabolic process is central to the body’s defense of all organ systems that need constant rebuilding and restoration. The reduced anabolism associated with prolonged stress is likely to be of great importance for stress related disease development.
Selye’s proposed non-specific stress response has been criticized in latter research. Recent animal studies show that stressors have different neuroendocrine profiles [80]. Mason [78] questioned the one-dimensional stress concept and emphasized the physiological balance between energy providing “Catabolic” process and regenerative “anabolic” process. Thus a large energy mobilization may be relatively harmless for the body if the subsequent anabolic process can increase their compensatory recovery.

Symptoms of physiological stress include increase in heart rate and blood pressure, decreased blood flow to the extremities and slowed digestion. Troublesome events that can activate the stress experience include death, divorce, illness, conflict, job loss, and retirement. Other negative stressors are worries, memories, or images that are produced internally by our minds. Positive life events also trigger the stress response in our bodies. These include marriage, birth of a child, purchase of a new home, or starting a new job.

Some of the causative factors are the ideal way to save our self from physiological stress. There are several things that we can do to decrease the impact of stressors in our life. Problem-solving prevents the recurrence of a stressful experience. Managing our time better reduces stress by creating a balance between difficult and pleasurable experiences.
1.4 Psychological stress

The sheer act of having to go through something can put a pressure on the mind, which can lead to problems both in the mind and the body. The psychological stress may be as simple as having to appear for an examination or an impending divorce or a loss of fortune that can leave one on emotional wreck. In stress response, there is a reaction which the body instantly respond when exposed to the stressor.

On the other hand, there are stress responses caused by interpreting the stressor after recognizing it. There are few people who get stomach aches before the tests and exams because of anxiety. This is also a stress response due to interpretation of tests and exams as something that don’t like or not good at. When it was a simple set of questions that has no effect on grades, that person would take it with no problem. In both cases, the questions are the same, and what is going to answer is the same, but there are stomach aches happening and not happening. The only difference is that there is a bad “image” to a test. We can see from this example that some stress responses depend on psychological matters. In this case, what kind of image one would get for an event, or how the stressor is interpreted would cause large difference on stress response.

Let us call the stress response that was caused by our bodies automatically sensing the stress as “physical stress response”. Also, let us call
the stress response that was caused by interpretation of stressor and psychological condition as “Psychological stress response”.

The effects of stress on psychological conditions include anxiety disorders, depression, high blood pressure, and cardiovascular disease, certain gastrointestinal diseases, some cancers, and even the process of aging itself. Stress also seems to increase the frequency and severity of migraine headaches, episodes of asthma, and fluctuations of blood sugar in diabetics. There also is scientific evidence showing that people experiencing psychological stress are more prone to develop colds and other infections than their less-stressed peers. Overwhelming psychological stress can cause both temporary (transient) and long-lasting (chronic) symptoms of a serious psychiatric illness called posttraumatic stress disorder (PTSD). The way stress affects the patient varies from individual to individual; the most common manifestations are psychological depression, anxiety, and obsessional behaviors [36].

Keeping our mind free of stress goes a long way in keeping the body healthy as well. Some simple techniques help us to regain control over psychological stress. Breathing techniques, yoga and meditation are some of the techniques to help fight stress.
1.5 Psychosocial stress

Numerous studies have demonstrated the negative effects of the psychosocial stress of modern lifestyles on the human body. For example, hypertension is a significant risk factor for cardiovascular disease [7]. Increased arterial blood pressure resulting from catecholamine release triggered by the central stress response has been implicated in response to psychosocial stress in populations experiencing rapid modernization throughout the world. Other studies addressing job related psychological stress have demonstrated correlations between increased stress level and hypertension.

The effect of short-term psychosocial stressor immune function, pregnancy and fertility in modern populations may provide some insight into the adaptive benefits of the central stress response in the context of natural selection [1].

1.6 Eustress and distress

Stress can be classified into eustress and distress. Good stress, we call eustress and bad stress, we call distress. Where stress enhances function (physical or mental or challenging work) it may be considered eustress. Persistent stress that is not resolved through coping or adaptation, deemed distress, may lead to anxiety or withdrawal (depression) behavior. The difference between experiences which result in eustress or distress is determined by the disparity between an experience (real or imagined) and
resources to cope with the stress. Alarming experiences, either real or imagined, can trigger a stress response [107].

1.7. Emotional Stress

There are many different reasons that people encounter emotional stress. Let us face it, having to deal with traumatic or difficult events in our life can cause a great strain. The source of emotional stress might be obvious for some people, and not so obvious for others. Experiencing emotional or physical stress causes an increase in heart rate, elevation of blood pressure, and release of stress hormones. All these result in a greater workload for the heart, which can be dangerous. Stress can cause a heart attack, sudden cardiac death, heart failure in persons who may not even know they have heart disease. Excessive physical exertion and emotional stress may cause problems in both men and women, but women seem to be particularly susceptible to developing heart problems in the face of emotional stress.

Emotional stress is frequently unexplainable because of the way it affects our bodies through our mental state. It influences our mentality so much that our physical state could really become unresponsive the minute it manifests itself; Some people could even resort to suicide when dealing with emotional stress, while it can cause others to merely contemplate eating a bucket of ice cream.
The symptoms of emotional stress include tearfulness, irritability, short-temperredness, sudden intense anger, hyperawareness, hyper vigilance, impaired memory, forgetfulness, inability to concentrate, Obsessive ness, depression, excessive shame, embarrassment, guilt, undue fear, low self-confidence, physical and mental paralysis at any reminder of the experience, thoughts of suicide and in some cases homicide and so on.

In addition to these stress symptoms, increasingly researchers are suggesting that diabetes, asthma, allergies, multiple sclerosis (MS), chronic fatigue syndrome, hyradentitis supurativa (painful skin disorder) and even some forms of cancer are caused or aggravated by stress.

Emotional stress is dangerous for the reason that it is unpredictable in terms of bodily affects and symptoms. Some medical professionals find it troublesome as they are unsure of what the body is going through and cannot aggressively follow a diagnosis based on some possible information. When a person experiences symptoms of stress, it is important to realize that the diversity is as important as the symptoms themselves. Individuals with congestive heart failure, coronary heart disease, known arrhythmias, or other heart or blood vessel diseases should avoid emotional stress whenever possible and learn to manage the effects of stress. Knowing how to best deal with the causes of stress and the associated symptoms will put us on the path toward feeling better.
1.8 Acute stress response

Acute stress is the stress that lasts a relatively short period of time. When a fearful or threatening event is perceived, we react innately to survive. Either we are ready for battle or run away – hence the terms “fight – or – flight response”. The acute stress response also called the “fight – or – flight response”, was first described by Walter Cannon in 1929 [17]. The theory states that animals react to threats with a general discharge of the sympathetic nervous system. It refers to the body's response triggered by stress to a perceived (not real) danger. Activation or arousal of the stress systems leads to a cluster of behavioral and physiological changes that are remarkably consistent. The stress response related to behavioral adaptation includes increased alertness and vigilance, improved cognition and focused attention and inhibition of vegetative functions such as appetite, feeding and reproductive function.

During an acute stress response, the autonomic nervous system is activated and the body experiences increased levels of Cortisol, Adrenalin and other hormones that produce an increased heart rate, quickened breathing rate, and higher blood pressure. Blood is shunted from the extremities to the big muscles, preparing the body to fight or run away. Consequently the heart rate is speed up, the digestive system is disturbed and various other autonomic nervous functions are also disturbed leading to loss of energy and strength in the body.
Once if the perceived danger is gone, the system comes back to its normal functioning through relaxation response. But if the stress is very chronic, the relaxation response doesn't happen resulting in various harmful conditions. The response was later recognized as the first stage of a General Adaptation Syndrome that regulates stress responses among vertebrates and other organisms. Though the stress response is important for the body, it is harmful too. In most cases stress response is triggered in situations in which physical action is not possible. This disrupts the sexual response and the digestive system.

1.9 Chronic stress response

Chronic stress is the stress that extends for a long period of time, and is often present as we perform our daily activities. Chronic stress can cause the breakdown of the body’s hormone, immune, digestive and detoxification metabolic systems. The key to discovering the cause of illness is an accurate diagnosis of the sources and impact of chronic stress. People suffering from chronic stress might feel depressed or incapable of getting through the day. They might even stay home in bed simply because they are experiencing stress but do not know how to deal with it.

McEwan and Seeman [81] described four possible situations that may cause chronic stress. (i) too frequent stress exposure, (ii) failure to habituate to repeated exposure of the same kind of stressor, (iii) inability to shut off the
stress response, despite that stress has terminate and (iv) Situations that cause regulatory disturbances of the stress system. Thus, it is of great importance to differentiate between acute and chronic stress.

<table>
<thead>
<tr>
<th></th>
<th><strong>Acute stress</strong> (alarm phase)</th>
<th><strong>Chronic stress</strong> (resistance phase and exhaustion phase)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart rate</td>
<td>Increase</td>
<td>Elevated levels through out the 24 hr day</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>Increase</td>
<td>Elevated levels through out the 24 hr day</td>
</tr>
<tr>
<td>Heart rate</td>
<td>Decrease</td>
<td>Inconsistent (the low frequency / high frequency ratio may be changed due to changed autonomic balance)</td>
</tr>
<tr>
<td>vibrating (HRV)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electro dermal</td>
<td>Increase</td>
<td>The effect is unknown</td>
</tr>
<tr>
<td>activity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EEG desynchronization</td>
<td>Increase</td>
<td>Probably no effect</td>
</tr>
<tr>
<td>EMG activity</td>
<td>Increase</td>
<td>Inconsistent (possibly elevated levels throughout the 24 hr day but the pattern is depending on the stressor)</td>
</tr>
<tr>
<td>Epinephrine</td>
<td>Increase</td>
<td>No effect (may be elevated levels throughout the 24 hr day)</td>
</tr>
<tr>
<td>Cortisol</td>
<td>Increase</td>
<td>Both increase and decrease possible (a changed diurnal variation is also possible)</td>
</tr>
<tr>
<td>(hypothalamic – pituitary – adrenal – HPA activity)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anabolic markers (e.g. testosterone, growth hormone)</td>
<td>No effect</td>
<td>Decrease</td>
</tr>
</tbody>
</table>

*Table: 1.9.1 Physiological response pattern associated with Acute and chronic stress*
The chronic stress response is much less studied and the existing results seem more inconsistent compared with findings associated with the acute stress response. The Table: 1.9.1 presents an attempt to make a crude and simple overview of the physiological response pattern associated with chronic stress.

Constant hyper stimulation of the adrenal glands ultimately results in adrenal exhaustion. This is the result of being in prolonged state of stress. The key to reversing adrenal exhaustion is to identify the sources of stress that have become chronic in nature. Evaluating both clinical and sub clinical sources of chronic stress is paramount to clinical success. Positive lifestyle practices along with specific hormonal and nutritional support protocols will enhance recovery. However, failure to properly diagnose and treat the cause (source) of chronic stress will result in further adrenal exhaustion, over time hormone, immune and metabolic system breakdown.

1.10 General Adoption Syndrome

General adoption syndrome (GAS) was a physiologic reaction which happens to protect the body when the body meets a stressor, no matter what kind of stressor that the body is facing. Stress hormones that remain in elevated state in blood for long time can become toxic and affect the cells of the body.
Stressor | Stimulus
--- | ---
General Adoption Syndrome (GAS) | **Hypothalamus**

\[ \downarrow \text{(Secreted)} \]

Corticotrophin – releasing hormone (CRH)

\[ \downarrow \]

**Hypophysis**

\[ \downarrow \text{(Secreted)} \]

Adrenocorticotropic hormone (ACTH)

\[ \downarrow \]

**Adrenal cortex system**

\[ \downarrow \text{(Secreted)} \]

Adrenocortical Hormone: famous for stress hormone, as a signal for an emergency

\[ \downarrow \]

Motor system, autonomic nervous system and immunity system start working.

Cerebrum and brain stem recognize the stress situation.

Adrenocortical hormone controls immunity system and hypothalamus in order to suppress the stress response from going too far.

| Stress response stress coping | \[ \downarrow \]
| e.g.: feeling uncomfortable, shivering, playing some sports for recreation |

| Stress disease (Maladjustment) | \[ \downarrow \]
| e.g.: headache, stress ulcer, cancer, death |

*Table: 1.10.1 Reactions happening in the body*
Long term exposure to stress takes the form of general adoption syndrome. This phenomenon is a commonly visible both in the employers and the employees of the corporate sector where the new challenges emerge on daily basis. The projects have to be executed in time. The sales targets have to be met. Statistics have to be presented in the board meetings. This results in continuous arousal of the body. When this arousal becomes chronic the stress related problems appear. More detailed reactions which are happening to the body is given in Table: 1.10.1.

While GAS is happening in the body, our body and mind is showing stress response towards the stressor. Unless the stressor disappears or the irritation from the stressor stops to irritate the body, GAS exists and stress response exists. This movement has given in Table: 1.10.2.

1.10.1 Stage of alarm reaction

This is the period of time that the body makes the defense organization against the stressor. To keep the unchangeable movement in body GAS happens. First, for a short period of time, “Shock phase” appears which decreases the power of resistance in the body. Little by little resistance power increases, the body function increases, adrenal cortex gets bigger and secretion of hormone increases. During this stage, the body releases adrenaline and a variety of other psychological mechanisms to combat the stress and to stay in control. This is called fight or flight response. The muscles tense, the heart
beats faster, the breathing and perspiration increases, the eyes dilate, the stomach may clench. Once the cause of the stress is removed, the body will go back to normal. There is also some activation of the HPA axis, producing Cortisol.

<table>
<thead>
<tr>
<th>Stressor</th>
<th>Perception, Judgment, Interpretation</th>
<th>“Safe”</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>“Danger”</td>
<td>Fade of GAS</td>
</tr>
<tr>
<td></td>
<td>Stage of alarm reaction: body’s resistance is changing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stress response</td>
<td>“Effective”</td>
</tr>
<tr>
<td></td>
<td>“Ineffective”</td>
<td>Fade of GAS</td>
</tr>
<tr>
<td></td>
<td>Stage of resistance: body’s resistance is maximum</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Response</td>
<td>“Effective”</td>
</tr>
<tr>
<td></td>
<td>“Ineffective”</td>
<td>Fade of GAS</td>
</tr>
<tr>
<td></td>
<td>Stage of exhaustion: body’s resistance decreases</td>
<td></td>
</tr>
</tbody>
</table>

Table 1.10.2. Stages of General adoption syndrome
1.10.2 Stage of resistance

This stage of resistance is the period of time when the body's resistance is maximum. Body tries to adapt to the stressor and defensive body reactions happen. If the stressor persists, it becomes necessary to attempt some means of coping with the stress. The adrenal cortex (outer covering) produces hormones called corticosteroids for this resistance reaction. Overuse by the body's defense mechanism in this phase eventually leads to disease. If this adaptation phase continues for a prolonged period of time without periods of relaxation and rest to counterbalance the stress response, sufferers become prone to fatigue, concentration lapses, irritability and lethargy as the effort to sustain arousal slides into negative stress.

1.10.3 Stage of exhaustion

The period which adoption ability comes to the limit and the resistance starts to decrease. At this point, all of the body's resources are eventually depleted and the body is unable to maintain normal function. At this point the initial autonomic nervous system symptoms may reappear (sweating, raised heart rate etc.). In this period stress response may over work or not work at all. The period which is the cause of stress disease and other disease is this period. Mental, physical and emotional resources suffer heavily. The body experiences "adrenal exhaustion". The blood sugar levels decrease as the adrenals become depleted, leading to decreased stress tolerance, progressive mental and physical exhaustion, illness and collapse. The result can manifest itself in obvious
illnesses such as ulcers, depression and trouble with the digestive system or even cardiovascular problems, along with other mental illnesses. In some cases death is the possibility.

1.11 Change in the body under stress

Stress is regarded as evil which has a harmful influence psychologically and physically. In fact, however, stress is really on our side.

![Diagram]

When our body accepts the stimulus as a stressor, the homeostasis is distributed. Then, our body copes with the stressor and secretes hormone through hypothalamus, hypophysis and adrenal cortex system. Hormones have influence on internal body organization. At this time, it also influences on the blood system and give effect on the immune system through white blood cell.
Also, it adjusts the works of organs through hypothalamus to autonomic nerve system. The change in the body is called “stress” scientifically.

What’s important is that hypothalamus gives order according to the stressor. And that the order is given to put the body back to its normal condition according to the stressor. No matter how much various stimulation is given to the body, there is no different to that hypothalamus works according to adjust that hypothalamus works according to adjust the body. This general movement is called “unpeculier” movement. The defensive system given out by the hypothalamus to adjust the body is called “General Adoption Syndrome (GAS)” and GAS appears at our body when our body is under stress.

When the adjustment order is given out, the effect on the body is called “stress response”, which mean. Stress response is the evidence that our brain and our body is moving according to the strong stimulus. By presenting stress response and being under stress condition, our body fights against the stressor.

1.12 A Model of the stress system

A model of stress system is represented in Fig: 1.12.1. It begins by distinguishing between physical stressors, such as extreme cold or infections, and psychosocial stressors, such as marital conflicts. The former type of stressor has a relatively consistent effect of the body, regardless of how it is interpreted, and it will affect an unconscious person in the same way as a
conscious one. Psychosocial events however are basically social interactions among people that must be interpreted in order to have meaning as stressors. Events that act as stressors generally relate to one’s status, one’s power, one’s territory and one’s belief systems. Disruption of such relationships leads to emotional responses, e.g. depression at loss of status and anger at invasion of one’s territory. Emotional responses, in turn, lead to attempts to cope with the situation by such mechanisms as displacement or denial. Depending on the emotion generated and the effectiveness of the coping attempt, as well as on the acuteness or chronicity of the event, different physiological responses will be produced. If the stressor is acute or transitory, there will be a rapid return to a prior state of dynamic equilibrium. If the stressor is chronic, e.g. due to persistent marital discord, a risk exists for the development of Selye’s disease of adaptation, psychosomatic illness, or emotional disorders.

It is important to emphasize that several areas of interaction exist between the reactions to physical stressors and the reactions to psychosocial interactions. For example, humans exposed to physical stressors, such as infections, may develop such reactions as swelling, redness, and pain, which are then interpreted by each individual in the light of the person’s own past history. Similarly, the acute or chronic reactions to physical stressors interact with the reactions produced by the person’s interpretations of his or her own life events.
The arrows in Fig: 1.12.1 expresses the idea of feedback loops. The various outcomes of stress, such as physical or emotional illness, are themselves stressors that the individual needs to evaluate and cope with. The stress outcome may influence any of the elements of the stress system: Cognitive evaluations, emotional reactions, coping or defensive response, and the state of stress itself.
1.13 Signs and Symptoms of Stress

Signs of Stress include apathy, lack of energy, difficulty making decisions, difficulty “keeping track” of things, feeling on edge, a change in eating habits, sleeping more than usual or difficulty getting to sleep, being more emotional, using alcohol or drugs to relieve or forget stress. Symptoms of stress include Chronic back pain, tension, headaches, neck pain, gastrointestinal problems (pain, diarrhea) and palpitations.

Stress is low when boredom increases, motivation decreases, concentration decreases. If it persists, thinking becomes tedious, which leads one to give up the endeavor. Stress is high when disruption in "the routine" increases, one becomes easily distracted, the situation/endeavor becomes a threatening response, it is difficult to focus, negative thinking is promoted, one’s self-confidence is damaged, worry develops. Stress is optimum when best performance occurs; optimum stress is different for each individual, causes sufficient arousal and interest to enable one to attend to the situation without being unhappy.

1.14 Stress Tolerance

Stress tolerance is the power to endure stress. The factors of stress tolerance are stress – reorganization ability, stress - avoidance ability, fundamental stressor – dealing ability, stress – conversion ability, stressor experience and stress capacity.
Stress – reorganization ability is whether or not we know the stress when it is there. Even under stressful conditions, being careless about it makes it easy to bear it. This differs between characters as well as physical constitution. Stress – avoidance ability is whether we make stress easily or not. Fundamental stressor – dealing ability is how we can get rid of, or diminishes the cause of stress. Stress – conversion ability is an ability to reconsider the meaning of the stressor, and to use stressor as a chance to improve our self.

Stressor experience is the number of experience with various stressors. Sometimes, seeing the same stressor makes we used to it, the situation turning less stressful. The other times, it weakens our tolerance. Stress capacity means how much stress we can hold in. if the level of the stress is within the range of the stress capacity, we will not feel stress as stress. Therefore if we have a small stress capacity, we won’t be able to bear any small stress, so we might complain or become sick. If we have a large stress capacity that means it is hard to recognize a stress response. The stress capacity may have been large when we were in a good mood, but it may become smaller suddenly when we get sick.

1.15 Stress Coping

Lazarus [62] has defined two types of coping. Problem – focused coping, or trying to actually alter a stressful situation, and emotion – focused coping, or reducing the upset or discomfort associated with a stressful situation.
without actively trying to change the situation itself. Stress researchers have expanded this distinction with a variety of lists of coping strategies people use. Through advances in science and technology, modern civilization has been able to conquer ignorance in many fields, but its pride in technological achievement is excessive and misplaced. It has triggered widespread feelings of competitiveness and envy. Financial tensions, emotional upheavals, environmental pollution and, above all, a sense of being overtaken by the speed of events, have all increased the stress of daily life.

All these factors strain the body, causing nervous tension, and adversely affecting mind. This is when feelings of isolation and loneliness take over. To deal with this, people turn to artificial solutions to cope with the pressures of daily life. Substance abuse, eating disorders, and destructive relationships are some of the substitutes people grasp at in their desperate search for consolation.

When people recognize stress, they try to get rid of in some way. This is a way to cope with stress. There are a lot of ways to cope with a stressor and people will use them differently depending on each person’s personality and situation. As stress response becomes greater, those ways of coping with stress becomes more necessary and important.
Environmental methods to cope with stress are reducing the importance of the situation; avoid stressful environments, removing the stressful aspects of the situation, reducing uncertainties, listening to music and relaxation tapes. Physical methods to cope with stress are engage in progressive muscular relaxation, learn breathing control, considering biofeedback, doing stretching exercises, get a massage and take a hot bath. Mental methods to cope with stress are learn more about imagery relaxation, engage in positive thinking, consider self hypnosis and auto suggestion.

1.16 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 our stress and be a healthier, happier and more pleasant person to be around.

1.17 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.
Yoga offers a good tool for stress management and relaxation. Left unchecked, stress can lead to a variety of health problems, including headache, insomnia, back pain, burnout, weight gain, anger and substance abuse. Yoga, with its quiet, precise movements can draw our focus away from our busy, chaotic day and more on the calming moment as we move our body through poses that require balance and concentration.