Introduction
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Life is an adventure in a world where nothing is static where unpredictable and ill - understood events constitute dangers that must be overcome often blindly and at great cost; where man himself, like the sorcerer's apprentice, has set in motion forces that are potentially destructive and may some day escape his control. Every manifestation of existence is a response to stimuli and challenges, each of which constitutes a threat if not adequately dealt with. The very process of living is a continual interplay between the individual and his environment, often taking the form of a struggle resulting in injury or disease.

[Rene Dubos, 1959]

The experience of stress is common to all living things. Stress can come from painful experiences such as failure in examination or it can result from pleasurable events like unexpected success. Everybody thinks that he is the only person facing the most stressful situations while forgetting the caveman's fear of attack by wild animals from the pre-historic period. The term stress is used in many different contexts today, often making its meaning ambiguous. To define stress "it is the nervous tension a person develops due to internal conflicts caused either by self or by (external conditions) environment". Psychologists as well as non-professionals usually employ the term stress to denote emotional tension emanating from psychological demand. Physicists and Engineers define stress as the force per unit area that tends to distort an object. In its most simplified sense, stress is what one feels when life's demands exceed one's ability to meet those demands. This in turn affects the homeostasis ("harmony", in which the steady state or balance of an organism is maintained). However the counteracting or adaptive forces also are activated to maintain homeostasis and that constitute the adaptive response. Thus,
stress is a state of threat to homeostasis, during which the body activates adaptive mechanisms to maintain the equilibrium (Chrousos et al 1989).

The physical and emotional stress response as we know it today, was revealed by Walter Cannon (1935) and he described stress as a pattern of physiological changes which prepared an organism for fight or flight. He in 1929 noted the rise in blood pressure of the stressed animals and assumed that it was due to the release of a hormonal agent, which was named as Sympathin.

A Canadian Physiologist Hans Selye first coined the term stress in 1936. Hans-Selye, the father of stress physiology viewed stress as a non-specific response of the body to any demand. Hans Selye (1936) for the first time reported the enlargement of adrenal gland, atrophy of lymphatic organs, ulceration of stomach and duodenum after exposing the rats to extreme cold, intense sounds and physical restraint for a period of 48 hrs. He described stress in terms of the General Adaptation Syndrome (GAS), when he hypothesized that a constellation of both physiological and psychological adverse changes in seriously and chronically ill individuals resulted from the prolonged and harmful application of the natural adaptive forces of the body on the individual. He divided this response into three distinct stages: -

Alarm reaction:- Induced by activation of the hypothalamo- pituitary - adrenal system which in turn modulates the activity of steroids, catecholamine, peptide and opioid system. 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.
Resistance: - If the cause for the stress is not removed, GAS goes to its second stage called *resistance or adaptation*. This is the body’s response to long-term stress, during which the adrenocortical activation was maintained and also hormones increase blood sugar levels to sustain energy and raise blood pressure. Overuse of 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.

Exhaustion: - The third stage of GAS is called *exhaustion* After several months of constant exposure to the physical stimulus the organism would enter the phase of exhaustion. In this stage, the body has run out of its reserve of body energy and immunity. Mental, physical and emotional resources suffer heavily. The body experiences "adrenal exhaustion". The blood sugar levels decrease as the adrenals become depleted, leading to decrease stress tolerance, progressive mental and physical exhaustion, illness and collapse.

The same spectrum can be comprehensively classified with examples into four distinct phases in the development of stress disorder.

Psychic phase

Psychosomatic phase

Somatic phase and

Organic phase.
Psychic phase

In this phase the person gets most of the psychological changes as a result of excessive psychic trauma leading to alteration in the behaviour such as sleeplessness, irritability, nervousness and restlessness.

Psychosomatic phase

As the stressful situation continues more and more neuroendocrine apparatus and the centres of autonomic nervous are stimulated to notice the increased blood pressure, increased pulse rate, tachycardia, palpitation. As these changes continue, the person ultimately becomes the victim of one of the psychosomatic stress disorders such as hypertension, ischemic heart disease, and peptic ulcer.

Somatic phase

In this phase the stress disorder gradually settles down in one of the organs as a result of excessive action of ANS. The exact cause of the involvement of a particular organ is to be found in the genetical and environmental background of each individual. This varies from person to person and is difficult to predict which particular organ is the target of stress disease.

Organic phase

At this phase of the disease, the patient comes with fully established organic lesions and typical clinical, radiological and laboratory findings. In modern life fast paced lifestyle, stress or mental tension is increasingly becoming a killer disease.

Hence it is clear that the behavioral and physical adaptation becomes particularly important in the stress situations and when they fail to correct deranged homeostasis it leads to disease conditions.
CLASSIFICATION OF STRESSES

Stresses are innumerable

On the basis of the severity of the stress exposed, it can be classified as mild, moderate and severe types. Stress can be either positive (unexpected success) or negative (death of a close friend). The positive stress is called “Eustress” while the negative stress is called “Distress”. Depending on the basis of duration of the stress exposed it can be classified into:

Acute (situation like a sudden demise of a close relative) or sudden stress

Chronic or recurrent stress (continuously working in the office day and night due to work load).

Stress need not arise within the body always like intolerable pain but can also come from the environment.

Environmental stressors

There are numerous factors, which can make up the environment. These include noise, vibration, light, heat and cold, particles in the air, gases, air pressures, gravity etc. The body is not a passive system and hence it responds to the physical stimulus. The magnitude of response depends upon a great number of factors. If viewed in engineering terms the 'transducers' of the body (sensors-eyes, ears, etc.) have their own specification in terms of responses to different types of physical stimuli. The body therefore senses the environment with a 'transducer' system, which has its own characteristics, and it reacts in a dynamic way to environmental stimuli.
Physiological changes in the body on cold environment

The stress encountered from the environment includes the pollution, very hot or very cold climates. It is inevitable to avoid the climate, as man has to migrate irrespective of the climate he got adapted due to job opportunity or personal reasons. During thermal stress the thermoregulatory system responds by changing its state in a way, which is consistent with maintaining core temperature within this range. When the body is exposed to cold the two main mechanisms for maintaining core temperature are controlled by the hypothalamus. The initial reaction to cold is vasoconstriction (Ramsay 1982) where peripheral blood vessels constrict and hence reduce the flow of blood to the body surface, which reduces heat loss. If body core temperature continues to fall additional shivering generates heat. If body temperature still continues to fall mental confusion occurs, unconsciousness and finally death due to ventricular fibrillation (heart failure).

Fujita (1999) has reviewed the responses of mammalian cells to cold exposure in detail. In principle, cold should reduce rates of enzymatic reactions, diffusion, and membrane transport (whereas heat would tend to accelerate these processes). According to Sonna et al (2002) the rewarming after exposure to cold leads to generation of free radicals and other toxic metabolites that are capable of inducing a stress response. Evidence suggesting that free radicals can attack and damage key biomolecule, including lipid, protein and DNA, causing them to lose their structure and function.

Even though the body regulatory mechanisms are in the body system, cold stress known to affect the body systems including the central nervous system (CNS) (Ogawa et al 1987, Vaswani et al 1988). Because of this well known fact the
research is focused not only to understand the stress induced alterations but also finding some way to manage the stressful conditions.

Stress management

In human it is possible to use exercise, meditation, hypnosis, cognitive restructuring, consultants, biofeedback mechanisms for relaxation of the stress. Yet in the modern society where lack of time is the major factor for human also supplementation of drugs (Smooker and Buckley 1970s) and vitamin (Machlin 1987) therapy become more common. The vitamins reported to be useful are Vitamin A (Avakian et al 2003), B-complex, C (Sahin et al 2002) and vitamin E (Sahin et al 2003; Schmidt et al 2002).

Among the vitamins, Vitamin E is a lipid soluble vitamin that is found in almost all lipid membranes; however, once a molecule of vitamin E interacts to stop the destructive nature of free radicals and oxidation by receiving or donating an electron, the molecule is rendered unavailable. This has led the investigators to the hypothesis that additional vitamin E may be necessary for animals subjected to extraordinary levels of stress and disease such as that of the complex Vitamin E scavenges the body for harmful free radicals and annihilates them.

In rats, stressors such as an electric shock to the foot which they cannot avoid, or being forced to swim in cold water without being able to remove themselves from the cold environment are better accepted model for stress studies (Telner & Singhal, 1984). However the effect of cold stress and forced exercise in such condition (cold water swimming) are rarely reported. It is well known that the amount of body fat is significant in determining tolerance to cold exposure, the metabolic response in both sexes being inversely related to the percentage of body fat as fat acts as an insulator. It has been reported that rats exposed to extreme cold
showed membrane changes due to lipid peroxidation (Goroshinskaya et al 1987). The present study was designed to take up an antioxidant vitamin E role in combating cold water swimming and its effects on the lipid profile and heat shock proteins.
CONCEPT OF HOW UNRELENTING STRESS LEADS TO DISEASE

ENVIRONMENTAL CHANGE

PHYSIOLOGIC IMBALANCE

EFFECTIVE ADAPTIVE RESPONSE

RESTORED BALANCE

MULTIPLE, SEVERE ENVIRONMENTAL

GREATER PHYSIOLOGIC IMBALANCE

DISEASE

ADAPTIVE RESPONSES BEGIN TO FALL

EXCESSIVE STRESS ON ADAPTIVE RESPONSES WITH EACH ENVIRONMENTAL CHANGE

PARTIALLY IMBALANCED SYSTEM MORE VULNERABLE TO FURTHER ENVIRONMENTAL CHANGES

BALANCE ONLY PARTIALLY RESTORED

MORE DEMANDING ADAPTIVE RESPONSE LIKELY TO BE LESS EFFECTIVE