The twentieth century has been called the age of Anxiety. Although the path to a meaningful and satisfying way of healthy life has probably never been easy one, it seems to have become increasingly difficult in modern times.

Recent research on causes of disease and aging has increasingly supported the singificance of stress. This area has proven particularly resistant to the approaches of modern medicine due,in part, to the incomplete understanding of the role of stress in disease and how to prevent or deal with the deleterious effects of stress (Chrousos & Gold, 1992; Eliot, 1979, 1982; Fries et al 1993; Henry et al 1990, 1977, Mckeown 1976; Sharma, 1993, & Weiner, 1992).

The word `stress' has a long history and is possibly derived from the latin root `stringere' meaning to draw tight (cox, 1978). The other meanings of it are, hardship, straits, adversity or affliction. Since 1513 stress meant overpowering pressure of an adverse force. Around 1963, we find the association of stress with storm, signifying the conditions, things compelling strained efforts. The word was primarily used to describe an external event, and only later it suggested metaporically an inner mental condition.

`Stress' has only recently been admitted into the medical vocabulary. For years doctors considered the term to unscientific to be taken seriously. The moment you used the word you were dismissed as a thinking individual, `Says Dr.Harold ward,

director of the stress medicine laboratory at Uni. of california at San diego. One reason was the lack of an adeqnate definition for the concept. Acccording to the late Dr.Hans Selye, the Australian born founding father of stress research stress is simply, `the rate of wear and tear in the body'. But others persist in using the term to refer to any external stimulus that causes wear and tear, or to the resulting internal damage. This has led to considerable confusion. Hence, stress, in addition to being itself and the result of itself, is also the cause of it self.

Earlier, stress emerged primarily from trying to survive in face of natural disasters like floods, earthquakes, draughts, femines, epidemics and diseases. Today's human, not only braves natural disasters, but also has the added task of facing man made disasters of environmental pollution, the overhanging threat of a third world war, mechanization, cut-throat competition, insulation, isolation and alienation. Somewhere in the bargain of tryng to overcome thr forces of nature, man is caught struggling, now to keep pace with himself. He feels unable to cope with the demands of life, and its hactic pace. Stress is an inevitable condition of human existence Although, stress affects some people more than others because of several reasons, yet no one is immune to it. It is only the threshould that varies. And therefore Modern psychologists and physiologists have started paying considerable attention to this phenomenon in theory and practice for its wide implications and applications. Over the past half century, stress has been widely studied, used as a variable in

models of behaviour and disease, and has achieved a notoriety in the lay public that few other bio-behavioural concepts have attained.

That people experience stress or that stress can affect performance on the job, our health, or our social relationships is generally accepted as a fact, and many researches have begin with evaluation of stress. Yet, in all of this work, stress remains an imprecise construct, easily operationalised as heightened blood pressure or self-reported distress.

The problem of Definition of stress

Despite the lack of a precise scientific definition of stress, everyone knows what stress is; the general concept of stress is found in many cultures and disciplines and reflects part of everyday experience for most of us. We can not provide a single difinition as it varies so much in magnitude, intensity, duration, and many other qualities;

Aspects of stress responding have been implicated in many mental health problems and in an array of physical diseases including Ht. disease, hypertension, cancer, arthritis, multiple sclerosis, GIT ulcers, AIDS, migrains headaches and infectious illnesses. How can a single construct be central in so many illnesses or problems ?

There are several other issues that make stress difficult to define and measure. The concept evolved more or less independently in biological and psychological traditions and attempts to integrate these perspectives have been slow (Baum et al. 1981; Cannon, 1932; Frankenhauser, 1975; Mason, 1975 and Selye, 1956, 1976).

Stress is defined by the `consise oxford Dictionary as a constraining or impelling force, an effort or demand on energy and as a force exerted on a body. In common language stress applies to any kind of hardship, burden, pressure or compulsion inflicted on a person or a material object. It produces characteristically a condition of tension or strain in the person or object affected by it.

Generally stress is understood to be the sum of irksome obligations, duties, and social conventions together with any other conditions of living and working that may give rise to worry, tensions, anxiety, conflict or frustration (Nathawat & Tiwari, 1980).

Stress, in a cogntive context, is understood in terms of a call for action, a person's awareness of the need to do something about a given state of affairs (sarason and sarason, 1981).

`Stress' can be described as a condition arising from a demand made on the individual requiring adaptation. It is a subjective condition in the sense that each individual may differ in their experience of stress and in their tolerance level for stress. While some amount of stress is beneficial and even essential to man, an excess of it can lead to unfortunate damage (coleman, 1964) on physical and mental health.

Many current definitions of stress are mainly based on the homeostatic energy- exchange models of common and other early researches.

Cofer and Appley (1964) stated `stress is the state of an organism where he perceives that his well being (integrity) is endangered and that he must divert all his energies to its protection.

The concept of stress has also been defined as anything constituting a threat, real or apparent, to the biological integrity of the organism (cox 1978).

According to Lazarus (1966) both the environmental stimulns and the reacting individual are vital elements and it is the nature of the relationship between the two. He says "Stress refers to a very broad class of problem differentiated from other problem areas because it deals with any demand which tax the system, whatever it is e.g. a physiological system, and the response of that system. In view of Basowitz et al (1955), the stress should not be considered as imposed upon the organism, but as its response to internal or external processes which reach those threshold levels, that strain its physical and psychological integrative capacities close to or beyond their limits.

A widely accepted definition of stress is that the stress is an internal state which can be caused by physical demands on the body or by environmental and social situations, which are evaluated as potentially harmful, uncontrolable or exceeding our sourees for coping.

Stemming from the above definitions some models of stress, based on their approaches towards it, can be identified.

The first approach treats stress as a dependent variable for the study describing it in terms of the person's response to disturbing or noxious environments.

The second approach describes the stress in terms of the `Stimulus' characteristics of those disturbing or noxious environments, making it an independent variable.

The third approach, views stress as the reflection of a `lack of fit' between the person and his/her environment. It is seen as an intervening variable between stimulus and response (cox. 1978).

Response based definitions and Models :

The response based approaches towards stress are concerned with the specification of the particular response or patterns of responding which may be taken as evidence that the person is or has been under pressure from a disturbing environment.

This particular view received its initial impetus from the writings of Hans selye. In his view "Stress is a nonspecific response of the body to any demand made on it". (Selye 1976).

Selye's General daptation syndrams' (GAS) is based upon the idea that the body can cope with stress but that, this coping has costs for subsequent copiing.

Long term exosure to a stress or repeated instances of adaptive demand deplete the body's adaptive reserves and lead to physical dysfunction. When first exposed to a stressor, the body responds by reactions mobilizing it coping capabilities; this alarm reaction represents preparations for resistance. When these reserves are made ready, the body enters a `Stage of resistance', applying various coping mechanisms and typically achieving suitable adaptation. When these reactions are repeated often, or when coping is not successful, however, adaptive reserves are depleted and the organism enters a `Stage of exhanstion'. It is

at this point that resistance declines, physioloical breakdown occurs and the body becomes susceptible to desease.

According to McGrath (1976), Stress involves an interaction of the person and the environment, something happens out there which presents a person with a demand or a constraint or an opportunity for behaviour.

Levi and Kagan (1971) have presented a model to describe psychological factors in the mediation of physical disease. Their main hypothesis is that psycholocial stimuli can and do cause disorders.

Cannon (1932) considered stress as a pattern of physiological reactions that prepare an organism for action either `flight' or `fight'. He explained many stress phenomenon the basis of his `flight or fight' theory.

Another response based definition of stress has received much attention is, stress as reflected in `degradation of performance' (cited in Cox, 1978).

Stimulus based definitions and models :

Stimulus based definitions of stress decribe and treat it in terms of the stimulus characteristics of environment which are recognized as disturbing or disruptive in some way. For eg. the life events approach (Holmes and Rahe. 1967; Dohrenwend and Dohrenwend, 1974). The model used is essentially an engineering one in which external stressors give rise to a stress reaction or stiain. with in the individual. This approach includes stimuli

that are diagnostic of stress. It freats stress as an independent variable. This view of stress was expressed very forcefully by Sir Charls Symonds (1974).

Welford has given a model of performance and demand. He proposed that stress arises when even there is a departure from optimum conditions of demand which the person is unable to or not easily able to correct (cited in Cox. 1978).

Interactional Definitions and Models :

Such a model attempts to intergrate the above two approaches and to evolve a comprehensive account of stress system. It expresses the view that stress arises through the existence of a particular relationship between the person and his environment.

Cox and Mackay (1978) suggest that stress can be most adequately described as a part of a complex and a dynamic system of transaction between the person and his environment. Lazarus (1966) proposed that `stress occurs when there are demands on the person which tax or exceed his adjustive resources'. Lazarus (1960) and Lazarus & Lunier (1978) proposed that the stress is dynamic process that involves (a) the individual's assesment of demand (e.g. how threatening is it) and (b) his self-analysis of his coping resources available to deal with the demands.

Related concepts to stress

Distress and strain are words commonly used in association with word stress. Distress is defined as severe pressure of pain or sorrow as anguish, exhaustion or breathlessness.

Strain is the exertion required to meet a demand, an injury or change resulting from such exhaustion of a body subjected to stress (cox, 1978).

`Fatigue' is another word commonly used in the same context as stress. This term defined as wearness after exertion or a long strain.

Yet another term found often to be associated with the word `anxiety'. Anxiety is a feeling of mingled dread and aprehension about the future without specific cause for fear. It is a strong overwhelming feeling of fear which is often accompanted by somatic symptoms. Such as palpitation choking, tightness of the chest, trembling and dizziness.

In western psychological literature (Freud, 1930) we find accounts that unfulfilled urges or desires lead to frustration and stress.

Psychological and phsical health are linked to life expriences high in stress. Loss of a loved one, loss of a job or divorce heightened susceptibility to disease, Furthermore western psychologists recognize the frustration as a function of the intensity of desires or needs. As need strength increases and

goal attainment is blocked negative consequences such as learning deficits are heightened. (cofer & Appley, 1964)

Is stress necessary ?

All living creatures need challanges to keep them stimulated and human beings are no exception. Without challanges. People become dull and apathetic and lose the will to live life to the fullest. The soft life is not attractive, in fact, it may hold as many potential dangers to fitness and well being as one in which there is a high degree of stress. Hence, stress is essential for life.

Reactions of our body and mind to the demands (stressors), which are perceived as of `moderate degree' perpare us to meet with the same (challange). Every succesful handling of the demand (known as custress) adds into our resources and copies abilities. This is the process of self-development.

Challanges can also be enjoyable and raise one's performance to unexpected heights. Tackling a difficult job successfully, tacking part in high risk sport, or watching a horror movie can all progvide one with an inner thrill. And, anxicty under one's control, can help one to perform at one's best in all kinds of tasks.

Upon exposure of an individual to the adjustive demand coping mechanisms are set in to bring about appropriate adjustments. Overt, damaging stress occurs when challanges become impossible to cope with it, when the person perceives threat to

adaptation, there is genertaion of potentially harmful changes in the psychological, behavioural and biological functioning of the individual, undermining both physical and mental health. This is called `distress'.

The concept of stress in Indian Philosophy

According to the Indian philosophical and religious traditions physical alterations or mental aberations or diseases are not treated in terms of the specific symptoms configurations but in terms of imbalance of the individual body and mind together within the context of their functioning of the higher level of selfhood.

The eastern traditional texts treat mind and body in confluence, it is difficult to find separate focused treatments of concepts like personality, emotions or stress. References to this concepts are spread throughout the ancient texts within the larger context of abstract issues, such as Moksha and Brahman, or Salvation.

When a person dwells in his mind on the object of sense, attachment in produced, from attachments springs desire and from desire comes anger. From anger arises bewilderment, from bewilderment loss of memory, and from loss of memory, the destruction of intelligence he perishes (Radhakrishnan, 1971).

The same, we can say in the way, that the state of frustration and accompanying emotional upset create impartment of intellectual functioning, leading to confusion, failure of memory

and problems with discrimination. All these lead to viscious circle of further failures. These are acceptable generalizations even today. The conditions leading to frustrations beginning with desires are at the root of experience of stress.

Suffering, according to Jainism (Pudgaljas) occurs through five kinds of psychological channels (asravas) which can overcome by proper knowledge, proper attitude and proper behaviour that culminates into self realization and liberation (Ranade and Paranjape, 1983).

Desire is the cause of worries and harvours miseries (Charak samhita Sarinasthans, 1-95). When all desires clinging to one's heart fall off, then a mortal becomes immortal, (and), one attains. Brahman here (Kath Upnishad, VII, 14, Limye and Vadekar, 1958).

Caraka, in the basic text of Ayurveda medicine, further states, "the three types of diseases, are endogenous, exogenous and psychic". Among these the first is that arising from the discordance of bodily humours, exogenous from spirit-possessions, poisons, winds, fires, injuries etc. While the psychic disorders arise from the gain or loss of undesirable or desirable things (Charaksamhita, 1949).

Another reason why desires are maladaptive is because they can lead to inflexible problem solving strategies strong goal oriented behaviours following strong desires which engender narrower conceptualizations and thinking.

The issue of desires and their fulfilment is complicated further by what we call ego involvements frustrations are more intense in the case of needs and desires with greater ego involvement. Needs acquire greater strength as they are reinforced by the ego e.g. research on self-concept suggests that when central beliefs of a person are counter acted or threatened, alienation and depression are more likely to occur than when less central beliefs, those with less ego involvements are challanged (Triandis, 1971).

Ego involvement leads to strong likes and dislikes, attractions and repulsions for objects having positive and negative values in terms of needs. In patanjal you sutras, these ego-involvements are called affliction (Klesas).

Two Indian words which correspond with stress are `Klesa' and `duhkha' where `klesa' has been crystalized to refer largely to the stressor aspect and `duhkha' in samkhya, more as the phenomenon of stress itself. The term klesa is derived from the root `Klis' meaning `to cause pain' an afflicted state a condition of pain. The klesas are not mental processes but are in nature of hindering load on mental processes. The concept is used as an intervening variable, stimulus and response aspects are both subsumed under it.

The klesas are innumerable but have been divided into five sequential phases in Patanjalis yog sutras. The "avidya" (lack of awareness of reality), "asmita" (sense of `egoism or amness'), `raga' (attractions), "dwesha" (repulsions) and "abhinivesha"

(strong desire for life) are the "kleshas" great affictions or causes of all miseries in life (Taimni, 1961).

The fundamental cognitive failure (knowledge without fundamental differentiations or mistaken knowledge. Where the nonself-mind and body are mistakenly considered as self and the real trascendental nature of self is ignored) "Avidya" or non cognition constitutes the first level of Klesha. It is akin to phenomenological stress and `Asmita', `Raga', `Dwesha' and `Abhinivesha' are considered to be the second level of Klesha based on the basic `Avidya'.

`Asmita' means informity between the potency of being the apprehender and the ability to apprehend, (self appraisal of an aroused organism). This intra-individual stressor indicates personal involvement in the situation.

The consequent phase of self-appraisal is initially defined as antieipation of satisfaction (Raga). It is a Kleska or stressor in the evaluation of the environmental details and, one's needs and abilities in context to the situations. Thus it provides the direction for behaviour.

The next phase is called `Dvesha' which means aversion. At this stage the individual percieves threat either one's own integrity for self-esteem or to one's need dominance. This involves the role of emotions appropriate in conflict. Competition, or antagonism. This corresponds to the stage of initial shock (alarm) in H. Selye's model.

The final klesa is called `Abhinivesha' literally `devoting oneself entirely to something'. Patanjali describes it as `constitutional and natural' and ever present urge in all living being to survive an individuals and `fear of death'.

The another word in Sanskrit for stress which seems to be more proper is `dukha'. It describes an organismic state involving the experience of emotions and characterized by an urge to escape or avoid. The exact origin of the word is obscure. If acquired the connotation of `trouble', `hindrance', `suffering'. Dukha is presupposed to emerge from bondage which in turn originates from ignorance and this can be eliminated by obtaining wisdom (`gnana').

The Samkhya system takes dukha to signify the stress that the individual experiences in the course of his interaction with the word around him. Samkhya thinkers have divided dukha into three divisions, namely, `adhyatmika' i.e. personal, `adhibhautika' ie. situational and "adhidaivika" i.e. environmental. Personal stress is occasioned by physiological (Sarira illustrated by the imbalance between 3 basic constituents vatta, pitta and kapha, resulting in disease) and psychological (manasa illustrated by emotional states like lust, hatred, greed, fear, jealousy, depression and so on). Stressors, situational stress is caused by unwholesome interpersonal transaction (conflicts, competition, aggression, exploitation etc.) and exposure to wild animals. The third kind of stress i.e. environmental stress is occassioned by a composite group of

environmental stressors, such as natural calamities and super-natural agents (extreme cold, sunstorm, lightening etc.).

Ayurveda gives an important concept of `Pragnapuradha' or volitional transgression which is said to be the basis of all forms of pathology. It shows its relevance to stress. Charaksamhita describes pragnaparadha as follows : the derangement of understanding, will and memory, the onset of adverse season, effect of past action and contact with unwholesome sense objects, these should be known as the causes of suffering. It is the inducer of all pathological conditions (Caraksamhita Vol. III, 1949).

Health is defined in the Ayurveda texts as the perfect balance of the three doshas : vatta, pitta and kapha, and disease on the imbalance. These 3 factors are involved in normal human constitution and responsible for all performances. Dosha is alike involved in prevention of stress and production of stress.

Ayurveda also suggests a classification of stressors :

i. aggressive attacks like, injuries from outside,
ii. Physiological disorders of organic changes brought about by the disturbances of three doshas,
iii. Psychological processes like, emotions, and,
iv. natural events like, hunger, thirst, aging etc.

Ayurveda enumerates and defined all the potential stressors in the normal interaction between the individual and his environment and strategies to avoid them. The stressors are regarded as intraindividual.

In yogvasistha one finds discussion of how mental disturbances lead to physical disturbances. Mental disturbances lead to (a) state of condition of Citta (consciousness), which has its proper function, (b) unnecessary excitation or agitation of the body, (c) disturbance in the breathing pattern, (d) disturbances in the circulatory system, (e) disturbances in digestive system and finally (f) creation of imbalance of the tridoshas, vatta, pitta and kapha (Pansikar, 1984).

The above description of the physiological changes due to mental disturbances agrees to a large extent with the modern psychosomatic theory. Every disturbance of mind be it a desire, strong emotion, conflict, or frustration, or an act of aggression or, attraction, create somatic representations. Psychosomatic integration and balance are basic to the Indian system of medicine. Disorders of body and mind are forms of suffering and reflect imbalance among the constituents called doshas or gunas.

`Yoga Citta-Vritti-Nirodhah' (Y-S-I-2). Yoga is a inhibition of the modification (distortion) of the mind etc. These emphasize the state of balance union with the endless ultimate and freedom from conflict. This concept of homeostasis in the Indian tradition is also complex and includes the integrated body-mind interacting system. Balance of this system is linked with freedom from suffering or stress.

Another Indian tradition of thought that provides the philosophy of life and affects the perception of life events is the theory of `karma'. It prescribes that one has to do his assigned work to the best of his ability, only the thing he has to renounce, is the expectancy of any outcome, thus can reduce the possibility of frustration and consequent stress.

The Indian tradition focusses on the goals and expectations the individual brings to the potentially stressful situation, and the avoidence of stress via internal contro.

Phenomena of Stress in Psychology :

The event or situation that place greater than routine demand and evoke stress reactions in an organism is called stressor. Stressors initiate the process by which they are recognized and response to them is generated. The goal of this process is to reduce the pressure or threats or the unpleasantness. But as a byproduct or consequences of this process, health changes may occur depending upon the magnitude and duration of stress as well as the form of response frastration, conflict and pressure are considered to be the types of stress. Frustration occurs when one's strivings thwarted, either by obstacles that block progress toward a desired goal or absence of an appropriate goal. Both environmental and internal obstacles can lead to frustration.

In many instances stress results from necessity of choosing between two needs or goals. Usually the choice of one alternative means frustration with regard to the other. Frustration and contlict are distinct sources of stress, but the frustration arise when we face conflict (when we must choose one alternative and give up the other). The necessity of making a choice involves `cognitive strain'. Conflicts are major sources of stress.

Stress may stem from pressure to achieve particular goals or to behave in particular ways. Such pressures may originate from external or internal sources. In some instances, pressures seriously tax the person's adjustive resources and when become excessive they lead to breakdown of organized behaviour of the

individual. It is apparent that a given stress situation may involve elements of all 3 types of stress.

Severity of stress is gauged by the degree of disraption in the human system that will occur if the individual fails to cope with the adjustive demand.

The severity of stress depends not only on the nature of stress and invidual resources - both personal and situational but also on how the sterss situation is perceived and evaluated. Several other objective factors influence stress severity, such as i) importance, duration and multiplicity of demands, ii) strength and equality of conflicting forces, iii) Imminence of anticipated stress & iv) unfamiliarity or suddenness of the problem.

The person's perception of the problem, the degree of threat it entails and available resources for meeting it, all influence the severity of stressful situations. Thus, situations that one person finds highly stressful may be only mildly stressful or even nonstressful for another. The factor that is often crucial in determining the severity of stress is the individual's own evaluation of the stress situation. Situations that place demands beyond the power of individual to meet are threatening to him and become more stressful. It depends on stress tolerance too. Stress tolerance is one's ability to withstand stress without having integrated functioning seriously impaired. People vary greatly in general vulnerability to stress both biologically and psychologically. Lack of external supports, either personal or

material, makes a given stress more severe and weakens an individuals capacity to cope with it.

Phenomena of stress in physiology

Living organisms survive by maintaining an immensely complex dynamic and harmonious equillibrium or homeostasis, that is constantly challanged or outright threatened by intrinsic or extrinsic disturbing forces or stressors. The steady state reguired for successful adaptation is maintained by counteraction reestablishing forces, or adaptational responses that attempt to counteract the effects of the stressors in order to reestablish homeostasis.

Although human societies have become more complex and in many ways more demanding, our physiologial mechanisms for coping with adversity have not evolved much. Hence, it seems that our physiological responses to social pressures, information overload, and rapid change resemble those set into motion during physical danger and outright threat to survival.

In physiology we may define stress as a state of disharmony or threatened homeostasis. The adaptive responses can be specific to the stressor or can be generalised and nonspecific. The nonspecific response can be streotypic and generally occur when the magnitude of the threat to homeostasis exceeds a certain threshold.

The main components of the stress system are the corticotropin releasing hormone and locus ceruleus, the pituitary

adrenal axis, and the limbs of the autonomic system. Activation of the stress-system leads to behavioural and biological changes that improve the ability of the organism to adjust homestasis and increase its chances for survivals.

There has been an exponential increase in knowledge regarding the interactions among the components of the stress system and between the stress system and other brain elements involved in the regulation of emotion cognitive function and behaviour as well as with the axes resposible for reproduction growth and immunity. This new knowledge has allowed association of stress system dysfunction, characterized by sustained hyperactivity and/or hypoactivity, to various pathophysiological states that cut arross the traditional boundaries of medical disciplines. These include a range of psychiatric, endocrine and inflammatory disorders and/or susceptibility to such disorders.

Claude Bernard extended the notion of harmony or steady state in the 19th century, when he introduced the concept of the `mileu interior' or the principle of a dynamic physiological equilibrium.

Watter Cannon later coined the term `homesstesis' and extended the homeostatic concept to emotional as well as physical parameters. He also described the `fight or flight reaction' and linked to adaptive response to stress with catecholamine secretion and actions.

In the 1930, Hans selye borrowed the term `stress' from physics and set it to mean the mutual actions of forces that take

place across any section of the body. He hypothetized that a constellation of sterotypic psychological and physiological events occuring in seriously ill patients represented the consequences of a severe, prolonged application of adaptational responses. He referred to this state as the `General Adaptation or stress syndrome' and redefined the concept of disease of adaptation.

Selye made it clear that not all states of stress, or threatened homeostasis were noxious when he coined the terms `eustress' and `distress'. He believed that mild, brief and controllable states of challenged homeostasis could be perceived as pleasant or exciting (eustress) and could be positive stimuli to emotional and intellectual growth and development. It was more severe, protracted, and uncontrollable situations of psychological and physical distress that Selye belived, led to frank disease state.

Stress sydrome

Both physical and emotional stressors set into motion, central and peripheral responses designed to preserve homeostasis.

Behavioural adaptation during stress

- Adaptive redirection of behaviour
- Acute facilitation of adaptive and inhibition of nonadaptive neural pathways
- Increased arousal, alertness

- Increased cognition vigilance and focussed attention
- Suppression of feeding behaviour
- Suppression of reproductive behaviour
- Containment of the stress response

Physical Adaptation during stress

Adaptive redirection of energy

- O_2 and nutrition directed to the CNS and stressed body site (s)
- Altered cardio-vascular tone, increased blood pressure and heart rate.
- Increased respinatury rate
- Increased gluconeogenesis and lypolysis.
- Detoxification from toxic products.
- Inhibition of the growth and reproductive systems
- Containment of the stress response.
- Containment of the inflammatory/immune response.

Centrally, there is a facilitation of neural pathways mediating among other functions, arousal alertness, vigilance, cognition and focussed attention, as well as appropriate agression, with recurrent inhibition of pathways that subserve vegetative functions.

Peripheral changes occur principally to promote an adaptive redirection of energy. Thus O_2 and nutrients are directed to the CNS and the stressed body site(s). Moreover increases in cardiovascular tone lead to elevation in BP and HR, while

increases in respinatory rate, gluconesgenesis and lypolysis all promote enhanced availability of vital substances.

Every element of the stress response, must briskly respond to restraining forces, otherwise, these responses lose their adaptive quality and contribute to the process of pathological change.

Stress System - Physiology

The general adaptational response is essential for survival. A discrete dedicated system has evolved for its co-ardination.

The two principal componeuts of the GAR are the cortiicotropin - releasing hormone (CRH) and the locus ceruleus - norepanephrine (LC-NE) autonomic (sympathetic) nervous systems. The CRH system is widespread throught the brain but is best characterized in the paraventricular nucleus (PVN) of the hypothalamus.

Increased CRH in the PVN sets into a series of physiological and behavioural responses that are adaptive during stressful situations. This include activation of the pituitary adrenal axis and sympathetic nervous system. leading to increases in glucose heart rate and blood pressure. In addition, it enhances arousal and promotes cautions restraint while inhibiting vegetative functions such as feeding and reproduction. Excess activation produces effects anxiogenic including hyperresponsiveness to sensory stimuli.

The LC-ME/ sympathetic systems are located in the brain system. Activation of LC-NE system leads to release of NE from an extraordinary dense network of neurons throught the brain, resulting in enhanced arousal and vigilance & increased anxiety. The sympathetic division of ANS is primarily associated with adaptive mechanism via its effectors, the sympathetic nerves and adrenal medulla.

Functionally, the CRH and Lc-NE/sympathetic systems seem to participate in a positive, reverberatory feedback loop so that activation of one system tends to activation of the other as well. eg. CRH increases the LC firing rate while NE is a potent stimulator to the release of CRH. The neuroanatomical context for these interations are complex but include projections of CRH. Secreting neurons from PVN to the arousal and sympathetic system in the hind brain and conversely projections of catecholaminergic fibers from LC-NE to PVN in the hypothalamus. The PVN/CRH and LC-NE/Symp systems respond to autoregulation.

A variety of other neuropeptides and informational substances play an important role in stress response (viz. arginine, vasopressin and dynorphin related peptides).

The stress system that plays so profound a role in setting the level of arousal also interacts with other CNS elements that influence the retrievalibility and analysis of information, the initiation of specific action and the setting of the emotional tone. 3 major brain systems are activated by the stress system & influence its activity (fig. 1).

1st the mesocortical and mesolimbic systems are activated by LC-NE/Symp. systems during stress. The former is thought to be involved in anticipatory phenomenon and cognitive function. The later is thought to play a role in motivational/ reinforcement/ reward phenomena.

2nd the amygdala /hippocampus complex is activated by noradrenergic neurones of LC-NE/Symp. System or by an `emotional' stressor, such as conditioned fear, generated, perhaps at memory storing cortical and sub cortical field. This activation of amygdala LC-NE/Symp. system is important for retrieval and emotional analysis regarding the stressor. The hippocampus appear to play a major inhibitory influence on the activity of amygdala and PVN-CRH system.

3rd, activation of the CRH in PVN leads to activation of arcuate pro orpiomelano Cortin neurons that counter regulates CRH neuron and LC-NE/Symp. system activity to induce stress related analgesia and to influence the emotional tone.

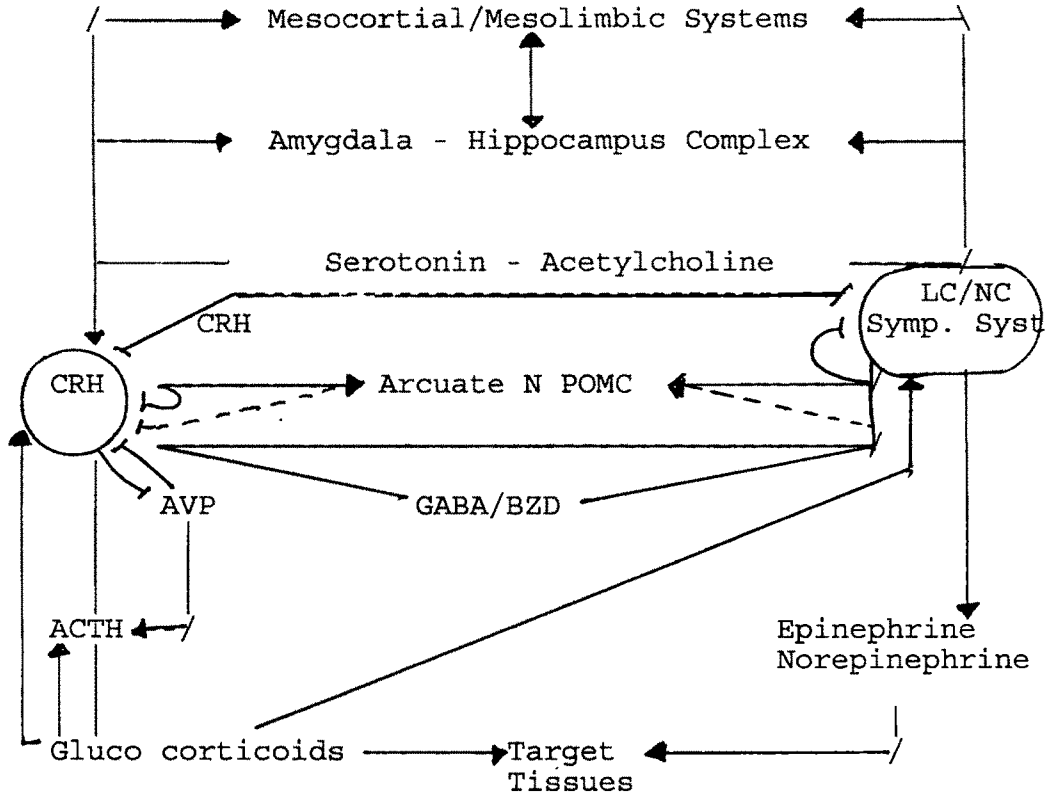


Fig1: The Central and peripheral components of the stress system, their functional interrelations & their relationships to other CNS systems involved in the stress response the hypothalamic CRH neuron in the paraventricular nucleus and the centers of arousal and autonomic systems in the brain stem represent major centers of the system connected anatomically and functionally to each other. POMC = pro-opiomelanocortin. LC/NE/Symp. Syst. locus cerulus noreepinephrine/ Symp System AVP = argenine vasopresin GABA = y amino butyric acid, BZD = benzodiazepine ACTH = corticotropin.

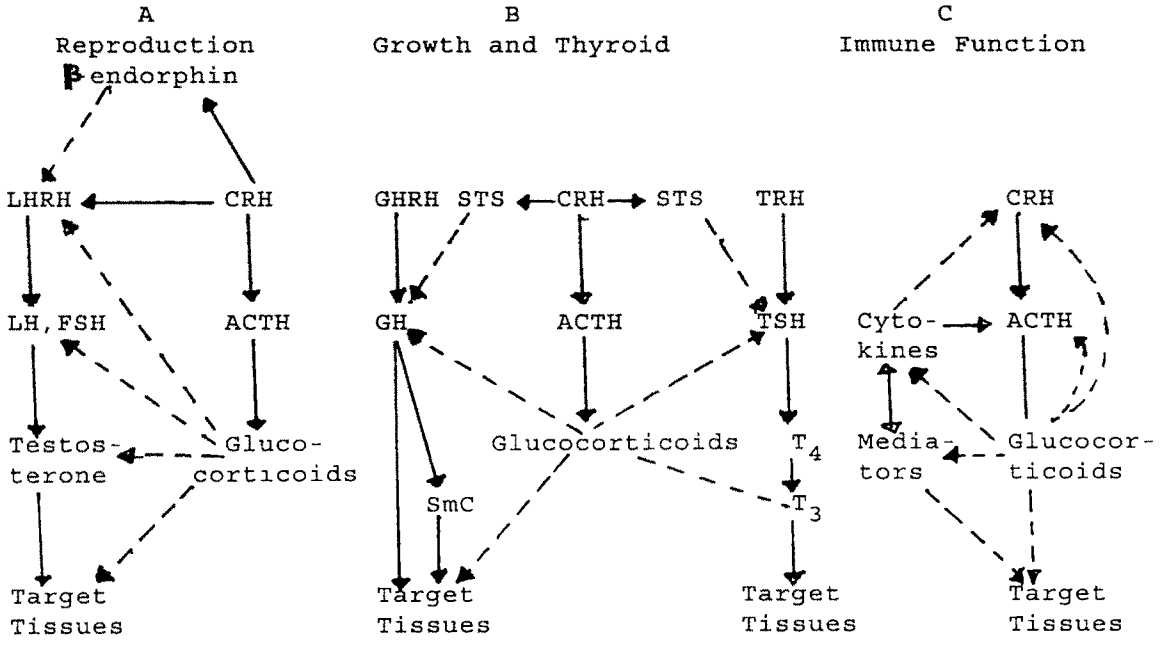
The systems responsible for reproduction, growth, and immunity are directly linked to the stress system and influenced by it. (fig.2)

The reproductive axis is inhibited at all levels by various components of the hypothalamic pituitary adrenal (HPA) axis (a) either directly or via β-endorphin. CRH suppresses the LHRH neuron of the arcuate nucleus of the hypothalamus. Glucocorticoids, exert inhibitory effects at the levels of LHRH neuron, the pituitary gonadotroph and the gonad itself and render target tissues of sex steroids resistant to these hormones.

The growth axis is also inhibited at man levels during stress (b). Although an acute elevation of growth hormone concentration in plasma in usually observed during the onset of the stress response, prolonged activation of the stress system leads to suppression of growth hormone secretion and inhibition of somatomedia C and other growth factor effects on their target tissues Increases in somatostatin secreation stimulated by CRH, with reslutant inhibition of growth hormone secretion and direct glucocortioid effects acutely stimulatory but chronically inhibitary on growth hormone, thus the stress related suppression of growth hormone section and inhibition of thyroid axis. Thus, stress is associated with decreased production of thyroid stimulting hormone, thus the stress related suppression of growth hormone secretion and inhibition of thyroid axis. Thus, stress is associated with decreased production of thyoid stimulating hormone and inhibition of conversion of the inactive thyroxine to more effective tri-iodothyronine in peripheral tissues. It may be

caused by the increased levels of glucorticods and may serve to conserve energy during stress. Inhibition of TSH by CRH stimulated increases in somatostatin might also participate in the thyroid axis suppression during stress.

The stress system aso has profound inhibitory effects on the inflammatory /immune response (c). Alterations of leukocyte traffic and function, decreases in production of cytokines and mediators of inflammation, and inhibition of the later's effects on target tissues are the main immunosuppresive effects of glucocorticoids. Conversely, however, several products of the immune system exert stimulatory effects on the HPA axis, hence, closing a negative feeback loop. Most stimulatory effects are exerted by the inflammatory cytokines interleukin I (IL-I) IL-6, and tumor necrosis factor or by mediators of inflammation such as several eicosanoids and platelet activation factor on hypothalamic CRH secretion. Figure -2 (a,b, and c).



The interactions between the HPA axis and other neurs endocrine system, including reprsductive axis (A), the growth and thyroid axis (B) and the immune system (C), where

LHRH = LH Releasing Hormone

CRH = Corticotropin Releasing Hormone

LH = Leutenizing Hormone

FSH = Follicle Stimulating Hormone

ACTH = Corticstropin

CHRH = growth hormone releasingh

STS = Somatostatin

TRH = thyotropin releasing Hormone

GH = Growth Hormone

TSH = Thyroid Stimulating Hormone

T_4 = Tetra iods thyromin

T_3 = Tri-iods thyromin

SmC = Somatomedin C

IL-1 = Interleukin - 1

IL-6 = Interleukin - 6

Stress System Pathophysiology

Dysregulation of the stress system expressed either as hyperfunction or as hypofunction, involves a no. of human health problems. The system is nonspecific and meant to interact with internal or external perturbutions in a quite similar manner Inappropriate adptational responses could be maladaptive and act as stressors themselves, feeding into a sustained vicious cycle.

Generally, the stress response is meant to be acute or atleast of a limited duration which renders its accompanying antianabolic, catabolic, and immunosuppressive effects, temporarily benefacial and no adverse consequences. Chronicity and excessiveness of stress system activation would lead to the syndromal state (Selye, 1936).

Severe chronic disease of any etiology could present with anorexia, loss of weight, depression, hypogonadism, peptic ulcers, and immuno suppression, which is due to increased and protracted production of CRH.

Whenever a person is exposed to physical or mental stress beyond his tolerance, a series of mental and bodily changes take place in succession, which can be divided into four stages :

i. Psychic stage : Only mental changes leading to alteration in behaviour such as, sleeplessness, irritability, nervousness, restlessness etc., usually accompanied by acetylcholine turnover in the cerebral cortex and hence the overactivity of entire CNS (Central Nervous System).

ii. Psychosomatic phase : as the stressful situation continues, more and more neuroendocrine appratus, ANS (Autonomic Nervous System) centers in hypothalamus especially sympathetic one become stimulated. As a result many of the bodily changes leading to increased activity of sympathetic part of ANS., in addition to hypofunction of CNS, which causes increased blood pressure (BP), increased heart rate, increased thyroid activity etc.

iii. Somatic stage : Stress disorders settle down in one of the organs as a result of excessive action of ANS. In the organs with more sympathetic supply e.g. heart, increase in the cardiac activity, while in other organ where parasympathetic supply is more eg. peptic ulcer, bronchial asthma etc. would be caused.

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 hence, it is difficult to say in each case as to

which organ will be the target of stress disease. However, since there are hardly any visible organic changes at this stage, they are reversible.

iv. In the fourth of organic phase there are patho-physiological demonstrable changes in the organs possibly due to prolonged action of neurohumors. These require specific medical or surgical treatment to overcome the disease. For the thorough understanding of the problems proper diagnosis of the stress disorder and its stage could be correctly assessed and managed. Apart from these, one should carry out certain laboratory investigations physiologically and biochemically to assess the exact stage and severity of stress disorders.

Treatment of psychosomatic disease should be planned accordingly. For the psychic phase psychotherapy and yogic practices would give relief from the symptoms. In the second stage along with these some of the drugs may be required. In the third stage of somatic phase drugs acting specifically on the target organ are needed, alongwith yogic practice and psychotherapy. While, in the last stage of organic phase specific medicine and/or surgery is required, of course, yogic practices would definitely help in preventing the further deterioration of the target organ and relapse of the condition.

Psychosomatic disorders : are a group of a certain specific illnesses with definite organic pathology in the causation of which psychological factors, especially, prolonged emotional stress, are believed to play a major role. The term `psychosomatic' is also comprehensive approach to illness in general in which attention is paid not only to somatic factors but also to psychological and social factors. In these stress is the main etiological factor. If the stress is maintained over a long period, it can become unendurable and may become expressed by physiological disturbances especially of the smooth muscle.

Although neurohormonal disturbances may lead to any kind of somatic illness, or psychosomatic relationship has been fairly well recognized in the following conditions :

i. Cardiovascular disorders : Essential hypertension coronary disease, effort syndrome, cardial neurosis.

ii. Respiratory disorders : Bronchial asthma (non-intective, non allergic), Hay fever, vasomotor rhinitis.

iii. Gastrointestinal disorders : Peptic ulcer, ulcerative collitis, anarexia nervosa, cardiospasm.

iv. Cutaneous (dermatological) disorders : Neurodermatitis, urticaria, pruritis, angioneurotic oedema, psoriasis, elzema.

v. Musculoskeletal disorders : Rhematoid arthritis.

vi. Urogenital disorders : amenorrhoea, dizomenorrhoea, dysmenorhoea, menorrhagia, premenstrual tension frigidily, impotence.

vii. Endocrinal and Metabolic disorders : Hyperthyrodism, diabetes mallitus, obesity, (thyrotoxicosis).

viii. Nervous disorders : (Vasomotor) - migraine.

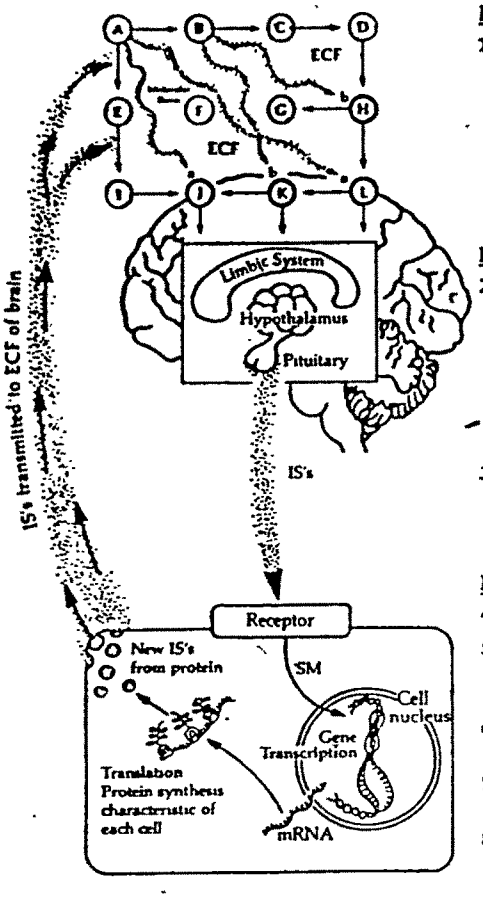
Occurance of stressful life events is known to precipitate attacks of illness or lead to exacerbations of illness. Relief of life stresses often leads to relief or decrease in the severity of illness.

There is no uniformity of opinion regarding the selection of one particular organ as the channel of expression. Some believe in the genetic and contitutional weakness of the organ concerned, others feel that a previous illness involving an organ conditions it to subsequent illnesses. Sometimes the involvement of a particular organ is just a concomitant of other illness. There is an importance of the premorbid personality in the selection of an organ.

Another believes in the specific correlation between the nature of the conflict and the personality make up of the individual as the determinant factor. Conflicts centred around love and dependency itself in conditions like peptic ulcer, ulcerative colitis, broncial asthma, etc. Conflicts centered around aggression and hostility results in sympathetic overactivity exhibited in conditions like, thyrotoxicosis, hypertension, migraine etc.

While reviewing all these factors of the psychosomatic diseases, it must be born in mind that the psychological factors are not the only responsible agents but the genetic, constitutional, endocrinal and metabolic disturbances also contribute in the production of these conditions. In one particular case, one or more of these factors may be of greater importance than the others. Neither factor alone is operative but it is the ultimate interactions of all the varied etiological factors which results in a psychosomatic condition.

Rossi and Cheek (1988) described a feed-back cybernatic loop : (Fig-3)



I THE MIND-BRAIN CONNECTION

1. Neural networks of the brain's cortical-limbic systems encode state-dependent memory, learning and behavior of "mind" (words, images, sensations, perceptions, etc.) with the help of cybernetic information substances from cells of the body.

II THE BRAIN-BODY CONNECTION

2. Neuroendocrinal information transduction in the limbic-hypothalamic-pituitary system of the brain. The information in neural networks of the brain is transduced into molecular (hormonal) information substances of the body.

3. Information substances (IS's) travel to cells of body with appropriate receptors.

III THE CELL-GENE CONNECTION

4. Cellular receptors binding IS's
5. Intracellular secondary messengers (SM) lead to activation of "house-keeping" genes
6. Transcription of genetic information into mRNA
7. Translation: protein synthesis characteristic of each cell.
8. New IS's from proteins flow to brain to cybernetically encode state-dependent aspects of mind and behavior.

Fig. - 3 : 3 levels of the mind-gene-molecular cybernatic network of information transduction.

Yoga for management of stress :

These patients have not to be treated for their stomach or heart alone. Careful attention has to be given to the emotional and the psychological factors contributing to these illness for better therapeutic results. Psychophysiological therapies such as Yoga therapy, behaviour therapy and biofeedback have been claimed to give good results in some conditions.

In recent years there has been an intense search for non-pharmacological measures not only to have control over these conditions, but also to prevent the development of these disorders. Man would like to mould his psychosomatic apparatus in such a way that he can bodily face the stress and strain of modern life without much difficulty. The modern man needs to learn how to increase his stress threshold or stress competence.

In the ancient time, the methods described by the earlier philosophers, sages, and spiritual leaders were used for maintaining tranquility of mind. Amongst them Yoga seems to be the earliest and the most effective method for providing peace and tranquility of mind. There are other methods which have developed in the various parts of the world and have probably derived from Yoga in the early periods.

In the far East, in Japan Zen meditation seems to be a well developed method for attaining mental peace (Suzuki). The word `Zen' is derived from Chinese word `Chan' which again has been derived from the Sanskrit word `Dhyana'.

In the Middle East, in Islamic countries the control of mental activity was done through `Sati' way, includes prayer. This is a form of `Bhakti Yoga'.

Europe and especially in Germany `autogenic training' is developed by Schultz for achieving mental relaxation. In this various types of auto suggestion and regular practice of relaxation lead to relief from many of the psychosomatic symptoms. Jacobson in USA developed a technique of producing effective muscular relaxation. `Biofeedback' in which autosuggestions of Schultz and relaxation techniques of Jacobson are combined with the help of an electronic equipment. Each one of these techniques has its connection with one or the other aspect of `Ashtanga Yoga'.

The derive full benefit of yoga one must follow in the principle of the full 8-fold yogic discipline described by Maharshi Patanjali, about 2000 years ago. As the system of yoga has its deep roots in India it is our duty to explore this yogic knowledge by the detailed study and conducting researches into various aspects of yoga, so that, the humanity at large can derive fullest benefit from it and manage with the stress and strain of modern life.

The practice of yoga has come down from the prehistorical past. It is well explained in Upnishadas and puranas composed by Indian Aryans in the later vedic and post vedic period. There are many schools of yoga, advocating different methods. But the main credit for systematizing yoga goes to Patanjali the author of

yog-sutra (yog-darshana). The volume contains 195 sutras in sanskrit language. Sutra is a highly condensed and very precise way of communication. Apart from oriental philosophy, we find wonderful depiction of some aspects of neurophysiology and principles of several psychotherapies understanding of which can bring about healthy attitudinal transformation in an individual.

Patanjali has recommended eight stages of yoga discipline. (i) Yama (restraints) (ii) Niyama (observances) (iii) Asana (physical postures) (iv) Pranayama (breathing control) (v) Pratyahar (withdrawl of senses) (vi) Dharna (concentration) (vii) Dhyana (meditation) and (viii) Samadhi (atainment of super consciousness). One may proceed on these stages step by step after attaining reasonable mastery on the previous stage. Of course, contemporary alterations in the interpretation of the basic texts and techniques can make the system more useful to the modern man.

There are 5 restraints in Yamas (i) Ahimsa or non-violence including avoiding bodily and mental injury to selt and others, (ii) Stya or truthfulness in all the dealings of life, (iii) Asteya or non-stealing of anything in life such as money, material, ideas, speeches or writings, (iv) Brahmacharya or celibary, which means restraining from indiscriminate sex, (v) Aparigraha or non-possession i.e. keeping one's requirements to the bare minimum. These are largely concerned with the individual's behaviour in context with his/her society. They help in building a healthy society.

Niyamas or observances are also five : (i) Shaucha or cleanliness of body and mind by acquiring clean habits, avoiding passion, anger, greed, delusion, pride, and jealousy, (ii) Santosha or contentment - even under adverse circumstances, which help in concentration and meditation. (iii) Tapas - or austerity with regard to food, exercise, rest, and recreation for leading towards development of integrity in one's character, (iv) Swadhyaya or intensive study - to make one's life happy, healthy and peaceful leading towards achieving one's goal. (v) Ishwara Prantdhana - surrendering oneself to God-Almighty to attain peace and sense of humility, to cultivate qualities like love, kindness, affection, charity etc., and to concentrate or to meditate better.

The Niyamas are concerned with individual's personal life style and habits. They contribute in the maintenance of physical and mental health.

One should learn about the physical postures (Asanas), breath controlling exercises (Pranayama) and Meditation from trained yoga teachers. One can practice these techniques regularly with sufficient care at a proper fixed time in the morning, on empty stomach.

The physical postures described in yoga are isometric exercises and hence the results of these are different from the usual physical exercises. Most of the cultural asanas described in different books could be used and correct the postural substrate of the individual and thus bring about a change at the

psychological level through proprioceptive feed-back. Sequential changing of asanas will help the mind to break the tendencies and to remain fixed to one thing. Steady and comfortable posture is advisable.

The breathing control (Pranayama) : is very useful tool in yoga, provided one can really go to the level of pranic activity in the body. Learning the process of breath control has tremendous benefit as the mental activities get modified. Regular practice helps to regularise various physiological and psychological functions in due course of time. Anulom-vilom pranayam with a ratio of 1:4:2 (maximum) as purak, kumbhaka and rechak can be practice one's own, but other types of pranayamas require the supervision of a yoga teacher. Initially, one may not start kumbhaka, but in a light of inner feelings one can gradually progress with Antar kumbhaka or Bahya-kumbhaka. Asanas and pranayamas work on psyche through soma (body).

Meditation has no universally accepted techniques, it is practiced in different way by different people. Vipassana type meditation consists of concentrating on one's own breath after setting off the sense organs. In the Transcendental Meditation described by Mahesh Yogi, chanting of some mantras while sitting in a relaxed posture for 15-20 minutes. Whatever the technique may be, one has to sit in a comfortable posture and close one's eyes and other senses and then allow the mind to empty all the stress and strain, which causes relaxation of the mind and brings normally of the entire psychosomatic apparatus to restart its work with greater vigour and strength.