
EDITORIAL**Origin and Management of Stress***Madhav Krishna Kolhatkar***Retired Professor of Pathology, Grant Medical College, Byculla, Mumbai - 400008,
(Maharashtra) India*

The theme of World Health Day 2013 is 'High Blood Pressure'. Stress has been identified as one of the most important underlying factors in causation of ailments related to the mind and body, including high blood pressure. Stress is a feeling which comes from any event or thought that makes one feel frustrated, threatened, angry, worried, nervous, helpless, hopeless and depressed. It leads to the general adaptive response.

Stress creates alert, hyperactive brain wave pattern. The fight or flight or stunned response of the sympathetic nervous system develops. It is designed to help us survive life threatening events. The sudden dangers that threatened human beings when they were hunters and gatherers have changed in modern era to passing examinations, performing on stage, meeting deadlines etc. The response of the body of "fight or flight" to an impending danger by releasing adrenaline and cortisone has remained the same. State of high alert for a short period is helpful. This is called Eu-stress [1]. But sustained stressful response is harmful. By default the word "stress" refers to "negative consequences" or distress. There are many theories of origin of stress. Walter Cannon [2] and Hans Selye [1] in early twentieth century extrapolated the inferences from animal studies to the human beings. They measured physiological responses of animals to external pressures like heat, cold, surgical procedures etc. Richard Rahe and others postulated that stress is caused by distinct

measurable stressors. They ranked these stressors by their ability to produce stress and prepared Holmes and Rahe stress scale [3]. Lazarus and Folkman [4] have suggested a transactional model focusing on the transaction between people and their external environment. A stressor is perceived as a threat, positive or challenging depending upon the coping skills of the individuals. Thus stress results from imbalance between demands and resources.

Health realization model [5] further focuses on the nature of the thought. It is the thought process of a person which determines the response to a potentially stressful situation.

Mind and Brain

Stress arises when the mind is in sustained state of disequilibrium. Understanding mind is still a problem for science. A relatively acceptable approach is presented by Maturana and Varela. According to them "mind" represents a process present in all living beings whether they possess a brain or not [6]. Maturana and Varela have explained that a living system is an autopoietic (self renewing network) system. It structurally couples with an external stimulus. The alteration resulting from such coupling is "cognition". The structural coupling represents embodied action which brings forth "a world" which varies with each individual. When a living being perceives a favourable or unfavourable stimulus, the living organism generates an emotional response. The response then creates an

urge to do something about it. If the problem is solved by structural re-coupling followed by stabilization of the autopoietic network, equilibrium is again established. Thus the mental process operates like a loop [perception → emotion → action → re-establishment of equilibrium]. Any new stimulus either attractive or harmful can again generate disequilibrium. Thus the loop or mental activity continues tirelessly as part of the process of living.

When brain is present the power of the mental process appropriately becomes more complex. The emotion and the urge to take action may generate thoughts. Thoughts can also generate emotions. Thought is thus always a reaction to some stimulus. It may be very trivial. Thought represents mental activity. When thought process fails to re-establish equilibrium stress starts developing.

Types of stress can be classified in two broad categories. First one is the Stress induced by environmental calamity wherein several individuals may be simultaneously affected. e. g. Earthquake, fire, flood, war, famine etc. In such a stress the affected individuals experience the stress in a shared “world”. In such situations people get together and help each other to manage the crisis. Though there is tremendous stress, it is often managed with little individual illness.

Second type includes stress faced by an individual alone. It is the stress within their individual world. There can be real stressors or imaginary stressors. ‘Real Stressors’ are financial ruin, loss of loved ones, loss of reputation (castigation by society), etc. whereas the ‘Imaginary Stressors’ are due to societal pressure, feelings of guilt, and jolts to “self esteem” such as failure or fear of failure, indecision etc.

Stress is induced by pressure of conformity. The society conditions individuals to follow a set pattern of behaviour. This may be in contradiction to the individual’s instincts. e. g. We expect children to do what we feel is good for them. It may not always be so.

Our brain has evolved in stages [7]. The first stage brain is called reptilian or “Id” brain. It is the oldest, still retained by us. It manages all body functions and reflexes. It mostly works at unconscious level. Digestion, respiration, circulation, excretion, reproductive functions, reflex activities are examples. The pons, medulla and spinal cord represent the reptilian brain. Stress generates when needs of instincts are not fulfilled. For example: starvation, difficulties in digestion, respiration, lack of scope for the reproductive function etc.

The second stage is the emotional brain. Numerous tiny peptides are secreted here. There are about 60-70 of them. The nervous system, endocrine system and the immune system communicate by using peptides. According to Pert [8] the three systems form a single psychosomatic network. Peptides are the biochemical manifestations of emotional feelings. The basic emotions like, fear, joy, surprise, sorrow, disgust, anger etc. and their mixture is experienced. The socially harmful six behaviours (shad-ripus षड्रिप), result due to mixture of emotions and the ego. These are represented as 1. Lust (*Kama* काम) 2. Anger (*Krodha* क्रोध) 3. Vanity (*Mada* मद), 4. Confusion about what is right and wrong (*Moha* मोह), 5. Greed (*Lobha* लोभ) and 6. Envy (*Matsar* मत्सर). These work at both subconscious and conscious level. Stress develops when emotions pent up. The emotional brain then uses faculties of the intelligent brain

to achieve fulfilment of emotional urges. i.e., a person with criminal tendency is afflicted with one or more of the emotional urges. He uses his intelligence to find devious ways to attain satisfaction even if that means harming others. The third stage is that of intelligent brain (neocortex) endowed with unlimited memory, capacity for grammar based language and effective communication. Imagination, analysis, logic, mathematics, creative arts are attributes of this brain. This brain really makes us the person we are. The seat of ego is mainly in the emotional and the intelligent brain.

Here again the left and right brain function differently. As shown by Jil Taylor [9] the left brain is endowed with capacity for analysis, logic, mathematics etc. It is the seat of the language function. It is responsible to memorize data in timely sequences. It constantly feeds us language based thoughts and tells us who we are. It maintains the sense of hierarchy and is associated with ego, ambition etc. Fear, anxiety and stress are experienced more due to left brain activity. It also develops values and discipline and can inhibit natural instincts and emotions (Superego). The right brain on the other hand is creative in nature. It takes a holistic view of everything and considers all beings as equal. It understands body language, tone of voice etc. The emotions in this part of the brain are peaceful and joyous. This part of the brain is generally fearless. It probably plays a minor role in stress production.

Balanced activity of the two brains leads to balanced behaviour. In today's world there is a general preponderance of the left brain which is so encouraged by our society from childhood onwards. This type of left brain preponderance

is the basis of exaggerated experience of "stress". One of the most important aspects of brain activity, related to stress development happens to be the "**default circuit**" [10]. This seems to be peculiar to the human brain. To understand this circuit we need to note two different modes of brain function. When we perform any activity with focussed attention, we remain in the "**present.**" Anterior portion of the cingulate gyrus controls attention and focussing. However, it is not possible for most persons to maintain a focus on anything in a sustained manner. In between, the brain switches to the default circuit. Here different brain regions get involved. Thoughts arise from memory and imagination and we travel in to the "**past and/or future**" and loose contact with the "**present**". The thoughts then become unrelated to the task in hand and we start day-dreaming. There is no limit to any imagined "harmful" situations which help to build stress. For example, an imagined fear of failure in an examination can haunt a child to take evasive actions like running away from home or indulge in some grievous action like suicide even before the result is out.

The further advancement seems to be development of what may be called "spiritual brain or the wise brain". This is mainly present in the foremost region of both frontal lobes. It extends from the top of the brain to the back of eyebrows. Regions in the insula and parietal lobes also share in this process. These regions of the brain have the population of "Mirror Neurons", some of which are fairly large and are called "Von Economo" neurons. Ramachandran [11] has expressed opinion that the discovery of the mirror neurons will revo-

lutionize concepts in psychology similar to the revolution heralded by discovery of DNA in biology. The mirror neurons are well developed only in human brains. They are present also in dolphins, elephants, primates, dogs etc. in smaller proportions. Their main function seems to be to perceive the feelings and thoughts of others (theory of mind). They form the basis of our social behaviour. The secret of our ability to learn greatly resides in these neurons. This is because they allow us to mimic the thoughts and actions of others. They also lead us to have the sense of judgement and wisdom. New emotions like empathy, sympathy, kindness, gratitude and love for all life forms seem to be generated here.

But they also generate the feelings of guilt when we have harmed somebody. Feeling of guilt forms a strong stimulus for “stress.”

Thus far we have seen how functions of different regions of brain lead to stress. Stress due to suppression of instincts (reptilian brain), stress due to unfulfilled emotional urges (emotional brain), stress due to lack of fulfilment of ambitions, damage to self esteem, disproportionate worry, anxiety, haunting fears etc. (intelligent brain), stress due to running amok of imaginary dangers (default circuit) and stress due to feeling of guilt due to harm done to others (mirror neurones).

Management of Stress:

The spiritual brain can help us in this attempt. Some groups of mirror neurons seem to help in introspection [12]. Introspection can be carried out without reaction – so called “choice less observation”. During such observation the mental loop is broken. Stimuli are acknowledged but there is no emotion and no urge to

take action. Thus the brain can remain active and alert with something like a “suspended or no-mind” state. In “no mind” state thoughts cease to arise. It is also called as the meditative state. In this state there is an alertness and focussed attention for sustained periods. Due to this we remain in the “**present**” and the circuits of the default brain are blocked. Emotions do not arise. Instinctive stimuli remain on low key. The left brain function is reduced and the sense of **space and time** diminishes. Due to this, order is established and stress is mitigated. Different spiritual activities (Adhyatmic Sadhana अध्यात्मिक साधना) seem to increase energy supply to the spiritual brain regions. Dendritic proliferations allow this part of the brain to work more and more in a sustained manner. This allows spontaneous reduction and elimination of stress. It is known that when a malicious thought is suppressed by external threat (like fear of law) a particular brain region is active but when it is spontaneously eliminated another brain region is active. Suppression aggravates stress but spontaneous elimination is devoid of stress.

Thus, in the management of stress, strengthening of the spiritual brain can be an alternative or an adjunct to counselling and drug therapy

Clinical Presentation and Variation of Response in Individuals

Common symptoms of stress are sleeplessness, tachycardia, palpitations, tachypnea, sweating, trembling, dizziness, dryness of mouth etc. Common stressors are related to need to adapt or change like in starting of a new job, job change, marriage, child birth, separation, divorce, illness of self or in the family, death of near ones and dear ones, financial crisis etc. It

is known that individual's ability to cope with stress varies according to his/her genetic and biological make up, personality as well as environmental factors. We have already seen that the "world" experienced by each of us is subjective and hence individually somewhat different from that experienced by others. The excessive vulnerability of individuals to stress inducing stimuli can be buffered through protective factors like social support, supportive relationships and problem solving skills. What relieves stress is also not the same for everyone. Life style changes like well balanced, healthy diet, enough sleep and exercise, healthy fun ways, break from work, relaxation techniques, [13] and meditation are known ways to reduce stress. It can easily be appreciated that exercise, fun ways etc. also tend to keep a person more in the "present." Ultimately everyone has to develop the capability of finding out right solutions at right time to get rid of unnecessary burden of stress. This is needed to prevent and get relief from ailments of body and mind resulting from sustained stressful situations of modern life. Conscious attempts at spiritual progress and sessions with trained counsellor can give considerable help in this process.

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***Author for Correspondence:** Dr. Madhav Krishna Kolhatkar, Address: 'Pushkar', 759/88 Lane No 4, Bhandarkar Road, Deccan Gymkhana, Pune-411004, Maharashtra, India
Cell: 9422506538 Email: mkkolhatkar@gmail.com