



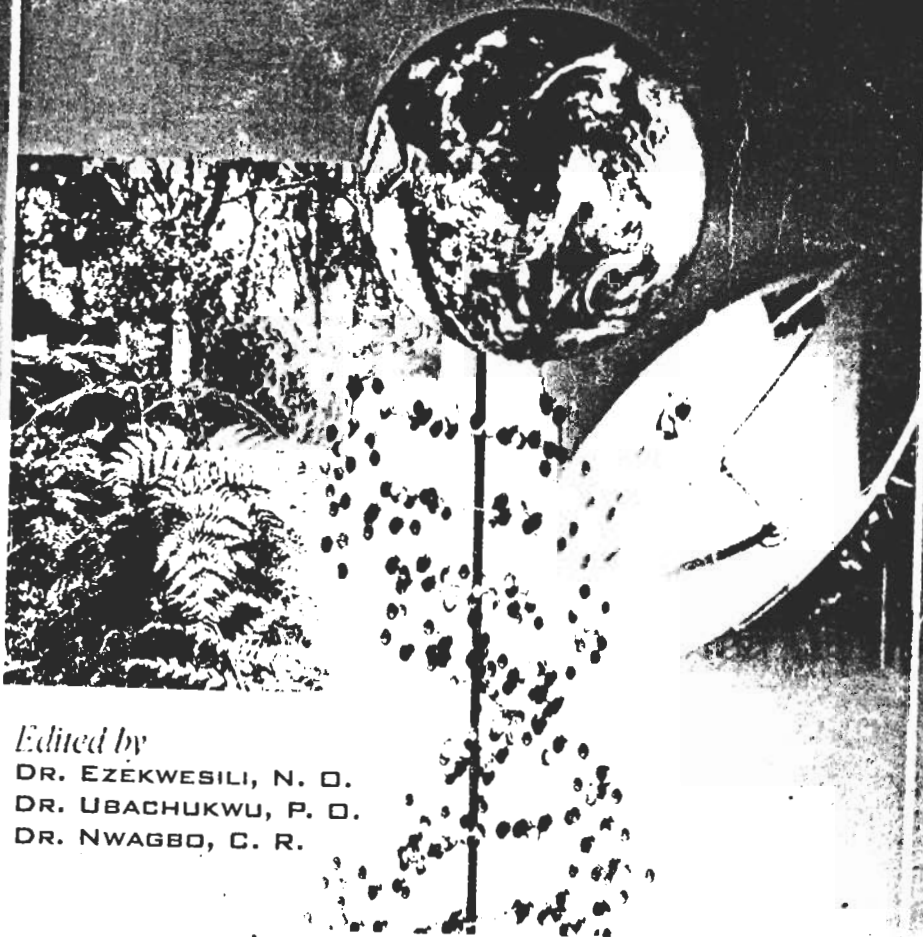
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Introduction To

# NATURAL SCIENCES-2



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## **STRESS: CAUSES, MANAGEMENT AND MEDICAL IMPLICATIONS**

**Nwamarah, J.U., Ezekwesili, N.O. and Obi, B.C.**

### **Introduction**

Stress is part of the normal illness of every human being in the present generation. Everybody has to note that no one person is free from stress, so it is an inescapable aspect of life. Stress is a complex issue that has drawn the attention of many people from the dawn of history. There may be stress at home, in the school, at market place, at work, on the streets and community. Problems arise when a person is faced with stressful situations. There is normally a change from his normal behaviour.

It is note – worthy that when a person is under stress, he/she is faced with disrupted emotional, cognitive and physiological functioning. One thing about stress is the fact that the effects of the environmental or physiological demands on the individual are dependent on how he/she perceives the demand. Therefore, not everyone reacts to the same situation in a stressful manner (Unachukwu, 1997).

### **The Concept of Stress**

Stress, because of its abstract nature, is difficult to define precisely. There is no one universally acceptable definition of stress. Cox (1978), observed that it is a concept which is familiar to both laymen and professionals alike; understood by all when used in a general context, but by very few when a more precise account is required. According to Clarke and Waltham (1995), stress involves the release of adrenaline - the same hormone which causes the "butterflies in the stomach" feelings when one is frightened. In other words, stress is an inherent physiological mechanism which prepares the organism for action and which comes into play when demands are placed on the organism. It is pertinent to note that not all stress is harmful. At a moderate level (eustress), it has a protective and adaptive function. At a higher level though, (distress), the stress response can cause pathological changes and

even death ( Helman ,1987).

The actual environmental influence - whether physical, psychological, or socio-cultural that produce stress, is termed a stressor, which Selye defined as "an environmental influence or agent that produces a stress-response in the organism." The range of possible stressors is therefore, extremely wide and varied. On the list could be included such events as severe illness or trauma, natural disasters, bereavement, divorce, marital conflict, unemployment, retirement, inter-personal conflicts or tension at work, religion or other persecution, financial difficulties, changes in occupations, migration, excessive exposure to heat, cold, damp, noise, a competition, an interview, examination, traffic jam, etc. Many of the stressors mentioned above involve prolonged major changes in the patterns of people's lives.

Attempts have been made on the definition of stress and these range from simple ones such as provided by *The Chambers 20<sup>th</sup> Century Dictionary* (1983) as hardship, strain; a constraining influence: physical, emotional or mental; pressure; force

*Medical physiology textbook* defines stress as a function of the sympathetic nervous system... mass sympathetic discharge increases in many ways, the capability of the body to perform vigorous muscle activity as summarized in these ways:

1. Increased arterial presence.
2. Increased blood flow to active muscles concurrent with decreased blood flow to organs that are not needed for rapid activity.
3. Increased rates of cellular metabolism throughout the body.
4. Increased blood glucose concentration.
5. Increased glycolysis in muscles.
6. Increased muscle strength.
7. Increased mental activity.
8. Increased rate of blood coagulation.

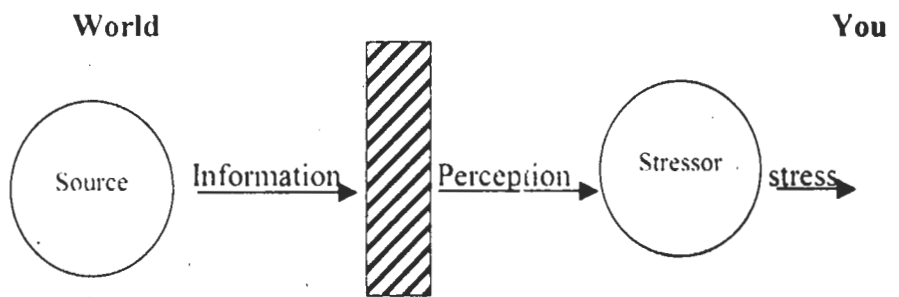
The sum of these effects permits the person to perform far more strenuous physical activity than would otherwise be possible.

### **The Physiological Basis of the Stress Reaction**

Selye (1946) first stated the theory of stress which, in his words, embraces all the various mechanisms through which the body responds to

the stress of life. Through his research, Selye was able to demonstrate experimentally and consistently too, in the course of his experiment with rats, a set of symptoms that he called stress syndrome. Selye discovered that a variety of impure and toxic gland preparations produced a stereotyped syndrome, characterized by atrophy of the thymus gland and lymphnodes; enlargement and hyper activity of the adrenal cortex; and the appearance of the gastrointestinal ulcers and weight loss. Further researches carried out by Selye showed that no matter what the stress may be, this triad and other simultaneously occurring organ changes, always occur. Some of these changes were signs of damage, others were manifestations of the body mechanism to defense against the noxious agents. From these findings, Selye developed the General Adaptation Syndrome (G.A.S), a term used to indicate the chain of events in the three stages of physiological changes in response to stress.

Selye's experimental studies, coupled with other researches in the field of stress over the years have also increased the awareness of the remarkable sensitivity of the pituitary - adrenalcortical system of psychological and social influences, even of a relatively subtle nature. It is now known that emotional stimuli rank very high among the most potent and prevalent natural stimuli capable of increasing pituitary adrenalcortical activity (Mascon, 1968).



**Fig. 17.1: The Interpretative Stress Response**

Source: Ecker (1985)

Two domains are identified, the world and you are separated by a distinct barrier. The only communication is the flow of information in the direction shown. The source and the stressors always remain within their respective domain.

The chain of events leading to an interpretative stress response is set off by a source in the external world. The source sends out information about itself. You perceive this information and interpret it according to your past experience. You may see the source as frightening, inviting, pleasurable, painful, challenging or irrelevant. If you perceive the source as a threat (like examination) to your stability, you will identify it as a stressor; (Note that the stressor exists in you and not in the world). Whenever a stressor exists in you, you will experience stress which prepares your body to deal with the perceived threat. Imagine, for example, that while walking down the street you look up and discovered that a car has just jumped the curb and is heading towards you. The source is the oncoming car and is sending information about its velocity and mass. By means of perception based on previous experience, you interpret the hustling car to be a stressor or the threat. As a result, you experience stress. Your body is immediately equipped to react to jump out of the way – is clearly an appropriate stress response. It achieves the result that stress is intended to accomplish – your survival (Ecker, 1985).

**Stressor:** This is the actual cause of the interpretative stress response. It does not exist in the external world. It is what you believe the source to be. As a product of your perception of the source, it exists only in you. It is built solely on your perception.

#### **Cause and Types of Stress**

The causes or sources of life's problems are known as stressors and they could be grouped into three major categories. According to Bakare (1986), they include: Physical, Social and Psychological stressors. He explained that physical stressors could be physiological or external factors such as raised body temperature or excessive noise, heat and cold, damage to body tissue, illness, bodily pain, floods, fire disasters and wars.

Social stressors arise from social interaction and include death of a loved one, imprisonment, loss of a job, forced retirement, divorce, financial loss and the like. Psychological stressors consist of the intense negative emotions which people experience and which could arise from either physical or social stressors. Some examples include emotions such as guilt, frustration, worry, anger, hate, sadness, grief, self pity, fear and many more.

Bakare (1986) reiterated that, when the state of stress, that is, the arousal, is mild and short-lived, we have what he described as normal stress which is experienced with minor problems of everyday life. Normal stress is invigorating and is a condition of life. If, however, the state of stress is intense but short-lived such as being in an airplane going through a one minute serious air turbulence, then we have condition known as chronic stress.

When there is stressful life event such as the loss of a loved one, a great financial misfortune or imprisonment for 21 years experienced by some Nigerian politicians, we have a condition known as crisis stress. Unachukwu (1987) concluded that crisis stress could also be chronic and it is the type that leads to illness, disease and eventually death.

Bakare (1986) made mention of Executive stress and described it as the type of stress that occurs in leaders. It refers to the particular psychological burdens carried by people who have responsibility for nation, organisation, institution and groups including the family. The sources of executive stress can be categorized into five different groups or stressors:

- (a) Environmental stressors – which derive from the location and the condition of the work-place, e.g. excessive distance from living abode, heat in the office, inadequate office lighting, furniture and over-crowding.
- (b) Organisational stressors – which include role conflict, job ambiguity, under-work and over-work, job insecurity responsibility for people, frequent changes, frequent travel, poor promotion prospects.
- (c) Interpersonal stressors – which includes personality conflict, mistrust, lack of support avoidance, physical quarrels and use of native medicine.



- (d) **Private life stressors** – which spill over into the executive's work situation and work performance. These include the executive's family problems, marital problems, financial concerns, lack of time for personal concerns, poor health and pressure from friends.
- (e) **Personality stressors** – which derive from the personal characteristics of the executive is a type A (hard) or type B (calm), intra-personal conflict, mental disorders, hereditary traits and personal belief (Bakare 1986).

Stress as it relates to the undergraduate students has been defined by Ezeilo (1995) as the subjective experience of the student when events associated with his or her student status interact with the student's personal characteristics to change his or her psychological and/or physiological conditions such that the student is forced to deviate from normal functioning. For the undergraduate, causes of stress can include the following – poor family upbringing, bad company, poverty, lack of facilities, over-crowding, perverted societal sense of values and double standards, social indiscipline especially of people in authority, social insecurity, unclear goals, social inequity.

Stress may also be associated with such specific factors in undergraduates, as the student's status. For example, if a student entered the university without the adequate qualification, he/she has already laid a solid foundation for the experience of stress as an undergraduate. Also lack of congruence between the student's expectation of university life and the actual experience; academic pressures – fear of failing a test or an examination, academic difficulty, fear of embarrassment from friends and families (in case of failure), financial constraints (insufficient funds leading to accumulation of debts and malnutrition); type of roommates, pressure from organizations on campus, all these add up to stress the undergraduate (Ezeilo, 1995).

### **The Chemistry of the Process of Stress**

Of primary importance in terms of stress is the fact that the hypothalamus clearly seems to respond to emotional psychological stimuli from the limbic system and to intellectually perceived stress stimuli from the cortex. Since it in turn activates the body's principal adaptive systems, the automatic nervous and endocrine systems, it appears to be a critical link in the chain of events through which psychological stress produces a

physical reaction. Wallis (1983). described what happens before the hypothalamus signal "stress" in response to causes of stress, ranging from over-work and quarrelling to loss of a job or a death in the family. This include the following :

- a) Chemical messages are carried along neuron tracks in the outer edge of the brain to the hypothalamus;
- b) stimulating the production of the chemical CRF (corticotropin releasing factor). Acting as a switching station, the hypothalamus sends the CRF and other chemical messengers down two tracks. This first track goes to the pituitary;
- c) where the chemical freight is changed again this time into the hormone ACTH (Adrenocortrophic hormone);
- d) it enters the blood stream and travels on to the outer layer or cortex of the Adrenal glands;
- e) here ACTH initiates the production of cortisol, a chemical that increases blood sugar and speeds up the body's metabolism. On the second track messengers leave the hypothalamus and trigger electro-chemical impulses down the brain stem;
- f) spinal cord;
- g) until signals reach the core of the adrenal gland;
- h) the result is a release of nor-epinephrine (adrenaline) which helps to supply extra glucose to serve as fuel for the muscles; and
- i) brain and nor-epinephrine which speeds up the heart-beat and raises blood pressure. Both tracks feedback to the pituitary;
- j) to regulate further the stress response.

Selye the father of stress research, mapped the hormonal pathways described by Wallis above some 40 years ago. Since then, scientists have found that stress provokes a number of even subtler chemical changes in the body that may have profound effects on health, both physical and mental. Scientists said that "there is a constant inter-twining of stress systems. It's much like a symphony."

Over the past two decades, researches have learned that stress triggers chemical changes in the brain. Particularly sensitive to emotional strains are the concentrations of potent chemical called neurotransmitters, which act as messengers between nerve cells.

Scientists also discovered that the body produces its own pain-killers, morphine – like chemicals named endorphine. Stress boosts the production of these analgesics, raising the pain threshold. This may explain the mystery of why seriously injured soldiers often feel no pain. Because stress alters the body's chemical balance, it seems to influence the development of many diseases, including psychiatric disorders. Depression has been associated with low levels of two neurotransmitters, serotonin and norepinephrine. Similarly, schizophrenia seems to be related to an excess dopamine.

### **The General Adaptation Syndrome (G.A.S)**

Reactions to stressful situations occur in three well-defined stages which Hans Selye called the General Adaptation Syndrome. The three well-defined stages are:

- (a) the alarm reaction stage;
- (b) the resistance stage;
- (c) the exhaustion stage.

### **The Alarm Reaction (or Alarm Stage)**

This is the first reaction of the organism when it is suddenly exposed to diverse stimuli to which it is not adapted. The alarm reaction is an instantaneous short-term, life preserving, sympathetic nervous system and hypothalamus response. The reaction has two phases, viz:

- i) Shock phase: This is the initial and immediate reaction to the noxious agent. As soon as a person feels or perceives a stressor, it triggers emotion arousal in the form of fears, anger, excitement, insecurity, helplessness, etc. This state of affairs presents typical symptoms such as tachycardia, loss of muscle tone, decreased temperature, and decreased blood pressure. This occurs in a flash of a moment.
- ii) Counter shock phase: This involves rebound reaction marked by the mobilisation of defensive phase, during which the adrenal cortex is enlarged and secretion of corticosteroid hormones and catecholamines are increased. This stage is the "flight or fight" reaction.

### **The Stage of Resistance (Adaptation).**

In response to the alarm, the body having been equipped with defensive mechanism, fight back to counteract the stress. A proper balance of hormones supports the body's effort to combat the effects of the stressor, and there is the consequent improvement or disappearance of symptoms. The organism's body weight tends to stabilize and at this stage however, there is a concurrent decrease in resistance to most other stimuli.

**The stage of exhaustion:** when exposure to stress is prolonged and severe enough, the acquired adaptation is lost and exhaustion follows because there is a limit to the adaptation energy of the individual. Since adaptability is definite, maladaptation diseases may follow from faulty adjustment to stress because the body is unable to adapt. Symptoms reappear and if stress continues unabated, death ensues.

### **Severity of Stress**

Stress may be mild or severe. The severity is gauged by the degree of disruption in an individual that will occur if the individual fails to cope with the stress. You might have observed that some people experience one stressful event after another and do not break down while others are seriously upset by even low-level stress. This happens because the severity of stress depends on the characteristics of the stressors and those of the individuals. The characteristics of the stressors include their importance, duration, intensity, rate, multiplicity, the degree of loss resulting from the choice of either alternative in a conflict situation, the imminence of the anticipated stressor and unfamiliarity or suddenness of the problem due to unpredictability, lack of preparedness and available ready-made coping patterns (Zimbardo, 1988). Characteristics of the individual's relation to severity of stress include perception of the problem and the individual's relation to the person's ability to cope with them. Also included is the degree of threat perceived as well as the level of frustration tolerance. People with low frustration tolerance tend to experience even mild stressors as severe (Averill, 1969). Besides these stress and individual characteristics, lack of external support – social or material may make a given stress more severe and reduce the person's ability to cope with it (Coloman 1980).

### Some Stress Management Strategies

Different people will react differently to the same stressors or stressful condition. In other words, stress responses are different even to the same stress. For an example, take two students who sat for an examination – one in first year, the other in final year. Their reaction in a case of failure, will be different although they were faced with the same condition of examination, because, whereas the first year student failed, he has a better chance than the final year student who may not graduate the same year as a result of the failure.

The impact of any stressful condition on an individual will depend on some factors. These factors, Helman (1987) classified as

1. The characteristics of the individual which include age, weight, build, genetic makeup, previous experiences.
2. the person's physical environment
3. the social support available to them
4. the economic status
5. the cultural background

How much a person thinks he/she is in control of a situation will also affect how he/she manages the stressful condition. If a person feels helpless over a situation, the effect of such a situation on him/her could be overwhelming, but if the person feels/thinks 'I'm in charge', the stressor may become a welcome challenge.

Most often than not, a little worry and apprehension before a stressful situation can help one cope with it. This helps to build up inner defenses and thus prepare for the outcome.

In a case study of people going through surgery, it was found out that three classes of people are involved (Kane, Blake and Frye, 1982).

The Class One people were the moderately fearful – they asked questions about the surgery, and showed tension from time to time. They showed concern about the dangers of the situation

The Class Two people were the highly fearful – they tried to postpone the surgery and they slept poorly.

The Class Three people showed no evidence of fear. They were cheerful and optimistic. No indication of fear of being harmed.

After the surgery, the people in Class One made the best emotional adjustment – their constructive worrying prepared them for what was to come.

The Class Two people remained in that state showing great anxiety while the Class Three people that were outwardly calm became resentful and angry because they failed to come to terms with the fact that the surgery would have unpleasant effects.

Some of the resistance to change is caused by fear of the unknown and a feeling of insecurity in what has happened in the past. Knowing this helps one to face change in oneself or help others to cope with change.

There are strategies which an individual can employ by himself to assist him in coping with stress and these take cognisance of the personality of the individual. Firstly, it is necessary to note briefly some strategies which individuals use which some authors according to Bakare (1987a) see as relatively ineffective. These management strategies include:

1. Escape or leaving the situation.
2. Defense mechanism and
3. Drugs.

#### 1. **Escape or Leaving the Situation**

An individual could manage a stressful situation such as the scene of a ghastly accident, physically by averting his eyes or by going away or sympathetically, by fainting. On return or recovery from his fainting episode, he still meets the problem there. This implies therefore that this strategy is only temporary.

#### 2. **Defense Mechanism**

This may be used to reduce the anxiety caused by the stressful situation. Example of defense mechanisms that could be used include projection, denial, compensation and rationalization. As Bakare (1987) rightly put it, these mechanisms explain the problem to oneself in a way which reduces their problematic character. In the real sense of it, defense mechanisms assist in some way but they often leave the actual problem unsolved.

#### 3. **Drugs**

There are many types of drugs and they include among others alcohol, sedative and tranquilizer, tobacco, marijuana, heroine, cocaine and amphetamines. These drugs may offer temporary relief from the

problem at hand but in the long run, they tend to cause other problems of their own to the individuals concerned. Based on our discussions so far, we may rightly conclude that these methods of stress management may not be advocated for long-term use and some of them may not be advocated at all.

One way of dealing with stress is to avoid unnecessary stressful condition by avoiding potentially stressful circumstances. For example avoid overwork which causes anxiety and tiredness. Do not allow assignments to pile up, schedule time properly.

Other ways one can handle or manage stress include – preparing for those situation that cause stress e.g. if presenting a seminar causes stress for one, such a person could handle the situation by rehearsing it before hand with a friend or friends.

- Relaxation : this absorbs pressure like a sponge (reading a favorite book or novel, carrying out specific techniques that assist relaxation like yoga, taking long walks, playing etc.
- Taking one's mind off one's problem by doing something else for somebody.
- Accepting responsibility for one's action – do not shift blames to others – this does not solve the problem but make others miserable too.
- Facing the reality of the problem and not try to escape from it.
- Admitting one's fearfulness about something helps reduce stress. Therefore, admit it if you are afraid, it's not a crime.
- Co-operating with others helps reduce stress. Do not compete, co-operate.
- Diet – control of change in dieting habits. Over-eating due to stress leads still to more stress
- Exercise and hygiene – maintaining physical health by exercise and hygiene reduces stress.
- Support – acknowledging one's problems and seeking support from friends, family or professionals also help reduce stress.

### **Medical Implications**

Some stressors are persistent and these have been linked to a wide range of diseases which are both physical and mental. There are two major dimensions of persistent stress which lead to a lot of diseases.

- (a) Persistent stress could twist human perception and this encourages **persistent negative reasoning**. This has been linked to the following conditions:
1. fatigue (mental and physical);
  2. irritability;
  3. frustration and worry;
  4. aggression;
  5. depression;
  6. negligence and abandonment of responsibility.
- (b) Persistent stress could impair body immunity and causes **various diseases** and worsen many illnesses. Such may include:
1. Hypertension (fore-runner to stroke and heart diseases). It can also cause ulcer, infertility, asthma, blindness, chronic headache, arthritis, etc.
  2. Alcohol/drug dependence.
  3. Sleep disorders. (Insomnia)
  4. Sexual disorders (impotence, ejaculation problems, frigidity).
  5. Nervous breakdown, insanity and sudden death.
  6. Skin problems, extra vulnerability to colds and flu, migraines, pains and obsessional behaviour (Moonie 1996).

People who are under great persistent stress are more likely to **have infection**, more apt to have accident or athletic injuries and **attempt suicide**. Mental illness like Schizophrenia and depression are linked **with stress**.

### **Conclusion**

Although it is assumed and rightly too that these many tips and revelations of responses and things to do will help reduce or remove **stress** from ones life, it is worthwhile to remind everybody that **"your health is your individual responsibility."**



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