

The Effects of Exercise on Stress Levels

Sarthak Srivastava

Assistant Professor, Department of Physical Education, Seva Bharati Mahavidyalaya, Kapgari, Jhargram

sarthaksrivastava@gmail.com

Cell: 9932327503

Abstract: According to WHO stress can be defined as a state of worry or mental tension caused by a difficult situation. Stress is a natural human response that prompts us to address challenges and threats in our lives. Everyone experiences stress to some degree. The way we respond to stress, however, makes a big difference to our overall wellbeing. But weather exercise is useful for relaxation from stress remains unclear. Therefore, the researchers intend to investigate to know the weather there was any significant effect of exercise on stress or not. 46 girls' students of B. P. Ed. and another 23 girls' students of department of geography of Seva Bharati Mahavidyalaya for experimental and control group respectively mean age ranged from (21+2) years were selected for this study. Result showed that after 24 weeks 6.25% decrease in stress level of experimental group whereas, 3.03% increase in control group. This may be due to the body's compensation mechanisms have succeeded in overcoming the stressor's effect.

Keywords: Exercise, Effect, Stress, Level

1. Introduction

Stress can be governed by several factors, only one of which is the external variable itself, with other important factors including the individual's unique perception of the stressor, and individual ability to cope with it. Different personality types and characteristics have been shown to be risk factors for stress and cardiovascular diseases, including the type A behaviour pattern (which is characterized as having an angry and hostile outlook), and the type D personality (which is characterized as having a tendency towards negative affectivity and social inhibition). These personality traits themselves may be further modulated by underlying genetic variables, substance use, nutrition, psychiatric and medical comorbidities, and sleep hygiene along with other environmental and sociological variables. Depression, anxiety, psychological distress, and post-traumatic stress disorder have all been shown to be risk factors for cardiovascular diseases. These variables are not synonymous with, but rather consequences of, stress and so, they often co-exist with stress. Individuals living in poverty show physiologic evidence of chronic stress, and although those of lower socioeconomic status have a higher prevalence of cardiovascular diseases risk factors such as diabetes, hypertension, smoking, and unhealthy eating habits, adjusting for these factors does not entirely attenuate these associations. Therefore, the term stress itself forms a construct reflecting the synthesis of various biopsychosocial factors variably interacting and affecting an individual at a particular point in individual life. In engineering, the application of stress to a material results in strain. Different types of stress applied for different periods leads to variable amounts of strain. This may lead to no change in the external form of the material but could result in unfavourable internal changes impairing the integrity of the material. Alternatively, that strain could lead to outwardly visible changes to the material's shape that could be unfavourable, leading to break down, or desirable, leading to a new and more useful product. Thus, challenging new life circumstances may not necessarily be unpleasant, but may just require more attention, and readiness, that could result in better life outcomes such as good performances in exams, sporting competitions, and job interviews. Stress can be acute, lasting seconds to days or even weeks, or chronic, lasting

months or even years. Acute stressors can be pinpointed to specific instances. These may be personal, including deaths in the family, and layoffs from work, both of which have been linked to cardiovascular diseases events, or impersonal, relating to natural disasters such as earthquakes, or manmade disasters such as terrorism, or even from watching World Cup Soccer. Chronic stressors may be discrete and identifiable, and along the lines of Freud's maxim "happiness comes when one finds pleasure in love and work" can be separated into stressors at home, and those in the workplace. Work stress can be characterized using the job-strain model, the effort-reward balance model, and the organizational injustice model, all of which are associated with an increased risk of cardiovascular diseases. At home, marital stress has also been associated with recurrent cardiovascular diseases events. Further, higher stress levels have been reported in those who are divorced or separated compared with those who are married. Lacking life partnership is closely related to and overlaps with social isolation, although studies evaluating the interaction between social isolation and marital/relationship status on cardiovascular diseases are lacking. This matter is further complicated by the fact that marriage and relationships can be sources of stress in of themselves. Studies have also shown that stress associated with receiving a diagnosis of cancer also increases the risk of cardiovascular diseases, as does caregiving to ill family members at home. Financial stress may be considered as a bridging construct between stress at work and at home, and is also associated with cardiovascular events. Chronic stress may also refer to smaller and less easily characterized micro stressors that include rush-hour traffic, performing household chores, social readjustment and isolation, as with the global pandemic, and work or personal goals and deadlines. Mental stress is a universal and shared experience of each of our lives. Estimates show that two-thirds of the general population has experienced mental stress within the past 2 weeks, with almost 50% rating their stress as "moderate or high." Not just a facet of the fast-paced, globalized, and technologically advanced society of the 21st century, the nature and sources of stress have been contemplated since the time of the ancients. Six centuries before the birth of Christ, Confucius told his pupils "Life is simple, but we insist on making it complicated" whereas almost a thousand years later, the

Roman Emperor Marcus Aurelius wrote “if you are distressed by something, it is due to your own estimate of it.” Yet our understanding of the biological consequences of mental stress is still developing. High level of perceived stress was associated with a poor quality of life and negative health behaviours. There were significant associations between stress and adverse health outcomes, a link between mental stress and depression, diabetes mellitus, cancer, and cardiovascular diseases, atrial fibrillation, and stroke. Therefore, the researcher intends to investigate whether there was any significant effect on level of stress or not.

2. Method

46 girls’ students of B. P. Ed. and another 23 girls’ students of department of geography of Seva Bharati Mahavidyalaya for experimental and control group respectively mean age ranged from (21+2) years were selected for this study. B. P. Ed. students were participating in exercise for 22: 30 hours/weeks for 24 weeks whereas control group not participated in any exercise.

Table 1: Exercise Schedule

Time	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
6: 00PM to 7: 00PM	Conditioning Circuit Training	Conditioning Pressure Training	Conditioning Pilates Training	Conditioning Plyometric Training	Conditioning Weight Training	Conditioning Fartlek Training
7: 15AM to 8: 00AM	Basket Ball	Volley Ball	Athletics	Basketball	Volleyball	Athletics
8: 00AM to 8: 45AM	Athletics	Kho - Kho	Kabaddi	Athletics	Kho - Kho	Kabaddi
3: 00PM to 3: 45PM	Kho - Kho	Cricket	Football	Kabaddi	Athletics	-
3: 45PM to 4: 30PM	Football	Athletics	Kho - Kho	Football	Cricket	-

Measurement Criteria: Stress was measured by questionnaire developed by Cohen, S., & Williamson, G. (1988). Perceived stress in a probability sample of the United States. In S. Spacapan & S. Oskamp (Eds.), *The social psychology of health: Claremont Symposium on applied social psychology*. Newbury Park, CA: Sage pretest and after 24 weeks post - test.

3. Result and Discussion

Result showed that after 24 weeks 6.25% decrease in stress level of experimental group whereas, 3.03% increase in control group. Hans Selye developed General Adaptation Syndrome (GAS), a profile of how organisms respond to stress. There are three stages in stress response: 1. Alarm 2. Adaptation and 3. Exhaustion or recovery. Alarm is the first stage that involves the ‘fight - or - flight’ response. This is the stage which enables us to deal with the difficult (adverse) situations. The body is prepared either to face the perceived threat, or to escape from it. This stage invokes various reactions in the body such as release of

Table 2: Mean of Level of Stress of Experimental and Control Group

Group	Pre - Test	Post - Test	“t” Value
Ex. Gr.	32+2	30+2	4.7958*
Con. Gr.	33+2	34+2	1.6956

stress hormones: cortisol, nor adrenaline and adrenaline from the adrenal glands, increased heart rate, rise in blood sugar level, increase in blood pressure, etc. If the stressful situation isn’t resolved the body uses all its resources (for example, continuous secretion of stress hormones to provide energy to deal with the situation) to adapt to the stressful situation. This is the adaptation stage. This results in various types of physical (sleep problems, general tiredness, muscular pains, indigestion, allergies, minor infections like common colds etc.), mental (lack of concentration), emotional (impatience and irritability) and behavioural problems (smoking and drinking). If the body’s compensation mechanisms have succeeded in overcoming the stressor’s effect there follows the recovery stage. But if the body has used up its resources and is unable to maintain normal function it leads to exhaustion stage. If exhaustion stage persists for a long time, it can cause long term effects where the individual is at risk of suffering from more serious health conditions. It may lead to depression, hypertension and coronary diseases. Following a stressful event the body acts at different levels to cope with the stressor. This is achieved through two major changes in the body: 1. change in pattern/amount of the release of the energy and 2. change in the distribution of energy. Several events occur to bring these changes. All such events are collectively called stress or the stress response. Stress is a multidimensional phenomenon which involves both nervous and endocrine system. The first step in stress response is the perception of the threat (stressor). Whenever there is some stressor - real or imagined, it acts at the level of brain. In the brain, it is the hypothalamus which perceives the stressor. When the hypothalamus encounters a threat, it performs some specific functions: 1. activates autonomic nervous system (ANS) 2. Stimulates Hypothalamic Pituitary Adrenal (HPA) axis by releasing Corticotrophin Releasing Hormone (CRH) and 3. Secretes arginine vasopressin (Antidiuretic Hormone ADH). Autonomic nervous system consists of sympathetic (arousal) and parasympathetic (relaxed) nervous system. The

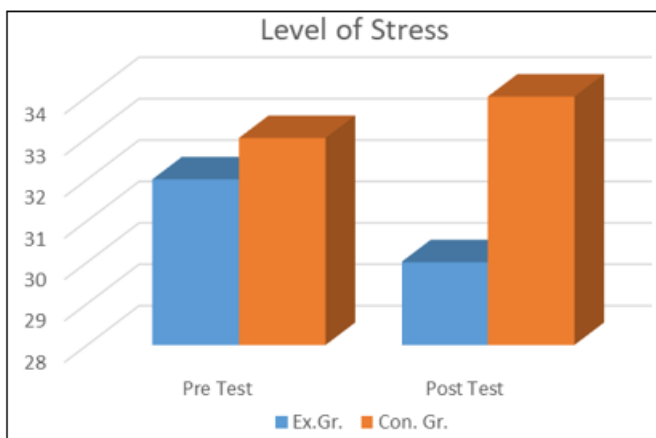


Figure 1: Mean of Level of Stress of Experimental and Control Group.

ANS regulates visceral activities like circulation, digestion, respiration, temperature regulation and some vital organs. The sympathetic system accounts for the flight - or - flight response. In response to a stressor catecholamines: epinephrine (adrenaline) and norepinephrine (nor adrenaline) are released at various neural synapses. The release of these catecholamines causes several changes like increase in the heart rate and force of myocardial contraction vasodilatation of arteries throughout working muscles and vasoconstriction of arteries to nonworking muscles; dilation of pupil and bronchi and reduction of digestive activities in the body. All these changes are required to prepare the body for fight - or - flight response. The effects of these hormones - epinephrine and nor epinephrine last for few seconds. The functions of parasympathetic nervous system are opposite to that of sympathetic nervous system and help in energy conservation and relaxation. CRH acts at the anterior pituitary gland an endocrine gland located in the brain. Pituitary gland is also called 'master gland', as it controls the secretion of other endocrine glands in the body. On stimulation by CRH, anterior pituitary secretes Adrenocorticotropin Hormone (ACTH). According to Scantamburlo et al., arginine vasopressin modulates the effect of CRH on ACTH secretion. ACTH released from anterior pituitary gland in response to CRH stimulates adrenal glands located on the kidneys. There are two parts of adrenal - the outer part called cortex and the inner part known as medulla.

ACTH stimulates adrenal cortex to release corticoids (glucocorticoids and mineralocorticoids). The major function of glucocorticoids is to release energy, which is required to cope with the ill effects of stressor. The energy is released by conversion of glycogen into glucose (glycogenolysis) and also by breakdown of fats into fatty acids and glycerol (lipolysis). In addition to this corticoid have several other functions such as: increased urea production, appetite suppression, suppression of immune system, exacerbation of gastric irritation, associated feeling of depression and loss of control. These are the symptoms generally seen in a person under stress. Mineralocorticoid (aldosterone) promotes Na⁺ retention and elimination of K⁺. It increases blood pressure by increasing blood volume. The medulla part of the adrenal gland secretes epinephrine and norepinephrine. The functions of these hormones are the same as that of those secreted from nerve endings of sympathetic nervous system. These hormones secreted by adrenal medulla, reinforce the functions of sympathetic nervous system. The release of these hormones from adrenal medulla acts as a backup system to ensure the most efficient means of physical survival. The effects brought out by epinephrine and norepinephrine from the sympathetic nervous system may be termed as immediate effects and the effects brought out by those of adrenal medulla are intermediate effects. The basic function of vasopressin or ADH synthesised by hypothalamus and released by posterior pituitary is to regulate fluid loss through urinary tract. This is achieved by reabsorption of water. In addition, ADH also has a prominent role on regulation of blood pressure during stress when the homeostasis of the body is disturbed in addition to release of energy second major change occurring during stress is distribution of energy to a particular organ that needs it most. This is achieved by increasing blood pressure. This occurs either through enhanced cardiac output or through constriction of blood vessel. In addition to HPA axis some

other hormones such as Growth Hormone (GH) and thyroid hormones also play significant role in stress. Growth hormone is a peptide hormone, released from anterior pituitary gland. GH is a stress hormone that raises the concentration of glucose and free fatty acids. It has been observed that, in human beings' psychological stimuli increase the concentration of thyroid hormones. Thyroid releases thyroxin and triiodothyronine. These hormones also have some significant function in stress. The main function of thyroid hormones is to increase overall metabolic rate or Basal Metabolic Rate (BMR). Thyroxin also increases heart rate and also the sensitivity of some tissues to catecholamines. Though, serotonin and melatonin are not considered as stress hormones yet they are associated with mood. A decrease in the levels of these hormones is thought to be related to depression. **Conclusion:** It may be concluded that the exercise for 24 weeks was beneficial for decrease in level of stress that may be due to the body's compensation mechanisms have succeeded in overcoming the stressor's effect.

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