Stress: A Potentially Deleterious Threat to Life

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Abstract
The major psychological disorder, depression is characterized by a sense of inadequacy, decreased activity, pessimism, hopelessness and sadness where these symptoms harshly disrupt and adversely affect the person’s life, occasionally to such an extent that suicide is attempted or results. Hence it is very relevant searching and understanding of the grounds of depression, and the expansion of additional treatments. The aim of the review is to investigate the evidence available in regard to stress and certain factors triggers stress and their impact on normal functioning of the body.

Key Words: Stress, Depression, Anxiety, Immunity and mental health.

Introduction
Depression deviates about 151 million people universally [1]. Anxiety develops naturally and unsurprisingly, then few people experience it more than others. Certain fears and worries are incontrovertible like, worry about a loved one or in expectation of attending a test or examination. The extreme, illogical fear about everyday state of affairs and influences with day-to-day activities, is an indication of anxiety disorder. The sensation of nervousness, apprehension and fear are the various manifestations of anxiety. When this persisting for 6 months or extended, it can be comprehended as anxiety disorder. But the melancholy is that many people seldom realize they have it. Hence, they may miss out on interventions that lead to a healthier, happier life [2]. Individuals at any phase can develop anxiety disorder, even children and inclines to appear gradually, with the first symptoms most probable to occur between childhood and middle age. It is striking that teenagers are predominantly vulnerable to having irritability as a part of emotional problems, including anxiety [3].

The primary indication of anxiety is a persistent and embellished sense of tension and stress, where the person fails to pinpoint the reason or motive behind the tensed feeling, or may worrying too much about usual things, like relationships or health. It may trouble ones sleep and mist their thinking and as a consequence again the person may feel irritable due to poor sleep [4].

Family history is a major risk for anxiety, but that alone is not the entire picture. The circumstances and experiences matter in anxiety. Brain chemicals named neurotransmitters, and a pair of structures in the brain called the amygdalae, seem to be involved in such conditions [5].

Central Stress Response system – The Stress axis
The brain is a target of strain and anxiety, together with stress hormones because the hippocampus possesses both type I (mineralocorticoid, MR) and type II (glucocorticoid, GR) receptors, and these receptors facilitate a biphasic response to adrenal steroids in the CA1 region of the hippocampus [6]. Allostatic over load may elevates some of the key systems like cortisol, sympathetic activity, and proinflammatory cytokines, with a decline in parasympathetic activity. Inadequate sleep, is a regular result of being “stressed out.” Sleep deprivation crops an allostatic burden that can cause harmful consequences.

Brain is the principal regulator of the neuroendocrine, autonomic, and immune systems and behaviour [7] and therefore any changes in brain function by chronic stress may lead to direct and indirect effects on the cumulative allostatic overload.
Hypothalamic-Pituitary-Adrenal Axis [HPA Axis]

The HPA axis plays a major role in evolving adaptive responses to physical and psychological stressors [8]. The HPA axis is an articulating and interweaving mechanism of the central nervous system and endocrine system. Disorganization of the HPA axis leads to the manifestations of depressive and anxiety symptoms. Acute stress consequently ends with alterations in adrenocorticotropic hormone (ACTH) and excess levels of glucocorticoids. Chronic stress, as seen in Post-traumatic stress disorders (PTSD), has been associated with reduced concentrations of peripheral cortisol and upregulation of the glucocorticoid receptors resulting in increased central feedback sensitivity. [9]. High cortisol level may damage our immune system (Fig 1).

(Fig: 1 Stress axis indicating the relationship between stress and immunity)

Diet, fitness level, and quantity of stress can disturb the physiological states of the body and experience through panic syndromes, panic attacks. Occasionally, agoraphobia is a type of anxiety disorder in which the person may feel fear and avoid places or situations that might lead to panic and feel uncomfortable.

Struggling with the symptoms of panic disorder, needs some routine modifications as a mode to assist manage the anxiety level. But continuing or chronic stress may result in long-term anxiety and worsening symptoms, with additional health difficulties. Stress can also lead to certain behaviors like skipping meals, drinking alcohol, and also insomnia. This again trigger or worsen anxiety, as well [10].

Certain factors linked with anxiety

Sleep and Obesity

Chronic sleep curtailment is a dangerous activity that causes anxiety. Sleep plays a major role in anxiety, as poor sleep has a sturdy effect on mood because the neurotransmitters required to support mood are replenished with sleep. Thus, restorative sleep is essential to preserve a balanced brain and help alleviate depression and anxiety. Various studies support the notion that insomnia is a risk factor for developing anxiety and proved that symptoms of insomnia and depression share bidirectional associations [11].

Some studies stated that acute sleep deprivation (SD) upsurges oxidative stress in the certain brain areas, viz; cortex, hippocampus and amygdala whereas former treadmill exercise averts this surge. Serum corticosteroid level also rise with SD but its levels are controlled in exercised sleep-deprived rats. Apart from this anxiety-like behavior
of rats pointedly rises with SD while prior treadmill exercise halts this increase [12]. It is well recognized that the consequence of sleep deprivation is impairments in affective states (e.g. amplified anxiety, depressed mood, anger, tension, frustration and irritability) and cognitive functions [13].

Sleep Deprivation for 30 hours significantly affected psychological responses without affecting physical performance. According to another study, it was found that 56 hours sleep deprivation was allied with a significant rise in self-reported indications of anxiety [14]. Furthermore, proinflammatory cytokine levels are amplified with restricted sleep and also the mental ability together with motor activities also get reduced from a different sleep restriction to 6 h/night [15]. Reduced sleep duration is linked with increased body mass and obesity [16]. Many studies reported the relationship between sleep restriction and weight gain by upregulation of appetite and decreased energy expenditure [17] upsurgs blood pressure, diminishes parasympathetic tone, increases evening cortisol and insulin levels, and elevating the level of ghrelin and decreases the level of leptin which in turn endorses augmented appetite [18].

Chronic stress may result in allostatic overload causes atrophy of the hippocampal neurons and the neurons of the prefrontal cortex and various other regions involved in learning and memory and other higher order functions of the brain. Sleep deprivation also cause hypertrophy of the neurons in the amygdala, and brain regions involved in fear and anxiety and also aggression. Sleep deprivation and anxiety may result in cognitive impairment, especially spatial memory, reported by studies done in animal models [19].

Obesity can be a cause for anxiety disorders through various pathways. For example, weight-related discrimination and stigma can be profoundly distressing for obese individuals. The hypothalamic–pituitary–adrenal axis disorientation is a contributory factor for appetite dysregulation and subsequent weight gain in stressed individuals. Symptoms of anxiety disorders will increase appetite, and also stimulate a craving for high-sugar and high-fat foods and this in turn will damage the normal physiology of the body [20].

Exercise and anxiety
If one is willing a few simple changes in life style can help. Avoid caffeine, unlawful drugs, and even some cold medicines, which can enhance anxiety symptoms. Seek enough rest and eat healthy foods and relaxation techniques, such as meditation. Likewise, exercise! Research confirms that moderate physical activity can be calming and soothing.

A sedentary life-style is a chief jeopardy for several diseases of contemporary life like, obesity, diabetes, cardiovascular disease, depression, and dementia, and many current studies have reported that moderate physical activity can be helpful for the brain and cardiovascular and metabolic systems [21]. Abundant research studies have found that exercise plays a maximum significant role in enriching mood and dropping symptoms of depression by increased physical activity, particularly alert movement, such as yoga, tai chi, and qigong. Because workout arouses the body to produce serotonin and endorphins, which are brain chemicals (neurotransmitters) that help depression [22].

The consequence of consistent exercise are certain physiological changes and adaptations in the body and is linked with lower sympathetic nervous system and hypothalamic-pituitary-adrenal (HPA) axis reactivity and exercise induced changes in the HPA axis may modulates various stress responses and anxiety in humans [23]. Regular aerobic exercise elevates serotonergic and also noradrenergic levels in human brain, similar to the effects of antidepressants [24]. An increased neuronal uptake of norepinephrine as well as an amplified level of norepinephrine in the hippocampus and frontal cortex of rodents after treadmill training and wheel running experiments, reported by Dunn et al, 1996 [25].

It is also reported that serotonin synthesis and brain metabolism also raised following exercise [26]. Hence exercise absolutely substitute the measures of adult hippocampal neurogenesis and also the release of β-endorphins, vascular endothelial growth factor, brain derived neurotropic growth factor (BDNF), and serotonin, which are the major pathophysiologic mechanisms for anxiety disorders. Moor et al, 2006, stated after studying a sample consisted of adolescent and adult twins and their families on lifestyle and health, that physical workout can help reduce the risk of anxiety [27].
Physical activities and exercises upsurge neurotrophin activity in the cortex and hippocampal regions of the brain together with neurogenesis in the dentate gyrus of young as well as aging animals [28]. Both exercises and dietary restrictions have an impact of on neurogenesis, which intensifies neurogenesis and raises the level of Brain derived neurotropic growth factor (BDNF) in the hippocampus. BDNF is an important factor that triggers neurogenesis [29].

These results confirm the acute effect of exercise i.e. the reduction in anxiety and depression even after a single session of exercise. The changes in anxiety, depression and individual’s mood after exercise are explained most frequently by the endorphin and monoamine hypotheses. Likewise, exercise may increase body temperature, blood circulation in the brain and has high impact on hypothalamic-pituitary-adrenal axis and physiological reactivity to stress. The benefits are noteworthy particularly in subjects with an elevated level of anxiety and depression because of more room for possible change. Virtually all the improvements are generated by rhythmic, aerobic exercises, using of large muscle groups (jogging, swimming, cycling, walking), of moderate and low intensity. Moreover, it must be conducted for at least 15 to 30 minutes and performed a minimum of three times per week in plans of 10-weeks or longer. [30]. Aerobic and non-aerobic exercise mutually contribute to reduce anxiety symptoms [31]. Exercise appears to be effective as an adjunctive method for anxiety disorders though it is less effective compared with antidepressant treatment. Systematic exercise is cross-sectionally associated with lower neuroticism, depression and higher extraversion and sensation seeking in the population. [32].

**Importance of Diet to balance anxiety**

The brain requires a stable stream of nutrients to function properly because it is one of the most metabolically active parts of the body. A meager diet is destructive, with low nutrients necessary to produce neurotransmitters and may incite symptoms of anxiety or depression. Hence it is very essential to follow careful and exact dietary strategies. Eat a healthy diet with fresh, whole foods and drink plenty of water, get enough calcium, and keep trans fats low. Studies verified the importance of supplementing with probiotics with two or more live cultures like lactobacillus and bifidobacterium and eating fermented foods, such as yogurt and miso, benefits to maintain a healthy digestive system [33].

Epidemiological indication supports the relationship between improved nutrition and better mental health. [34, 35]. Stress habitually triggers eating of comfort and desired foods [36]. Not only the hypothalamus [37] the hippocampus has also been associated with the turbulences of food intake and body weight regulation, mainly for its ability to limit unrestricted food intake. Lesions or any trauma of the hippocampus results in augmented body mass due to increased food intake [38]. A few observational studies by Almudena et al, 2013, demonstrates an inverse association between adherence to a Mediterranean diet and the danger of depression. The study compared the effects of two Mediterranean diets versus a low-fat diet on depression risk after at least 3 years of intervention by randomized trial and concluded that there is an inverse association with depression for participants assigned to a Mediterranean diet supplemented with nuts [39].

Depressed people possess problems with alcohol as alcohol use may be a technique to numb the pain of their depression. But alcohol itself is a depressant. More over both depression and alcohol addiction may have a contributory effect with each disorder increasing the risk of developing the other [40]. People depending on alcohol to lessen emotional stress, may be self-medicating with alcohol, but researchers reported a link where depression predicted alcohol use disorder and alcohol use disorder predicted depression [41].

**Social relationships and self esteem**

Being sedentary alone with our problems will never help to resolve the glitches, but it triggers more stress and physiological harm. On the contrary, sharing with friends or family will definitely calms your mind and help you to find solutions to your problems. Hence it is important to have a good network of friends and family.

Social relationships and support networks diminish isolation and loneliness, both key risk factors for depression. While anxiety can occasionally cause us to avoid other people and become isolated. Reaching out to friends and family can certainly support us deal with anxiety by offering care and helping us make accurate assessments of fears. A cross-sectional study envisioned to examine the factors linked with work stress amongst hospital staff members and to evaluate their health-promoting lifestyle behaviors recruited 775 professional staff from two
Regional hospitals in Taiwan using purposive sampling specifies that high demands, little decision-making authority, and low levels of social support were allied with the progress of stress-related symptoms. Correspondingly it is suggested that improved performance or a higher frequency of health-promoting life-style behaviors might lessen the probabilities of hospital staff developing stress-related symptoms [42].

“Friends for Life”, a cognitive-behavioral method used for the preventing and dealing of anxiety related depression and disorders in children. This program empowers children to cope with feelings of anxiety and depression and learn relaxation, emotional flexibility, problem solving ability, and self-efficacy techniques [43]. Friends for Life program is suggested by the World Health Organization (WHO) to avert the progress of anxiety disorders in children [44].

Additionally, our attitude determines the levels of stress in our life. Optimistic outlook, good health and self-esteem are the major uniquely human-oriented concepts and these three are inter related each other. A positive attitude is the greatest practice to reduce stress [45], and good social sustenance has a positive impact to diminish allostatic overload [46]. By combining fleeting experiences during a working or leisure day, was found to be linked with lower cortisol production and higher heart rate variability by strong parasympathetic activity, a symbol of cardiac health [47].

Laughter is an effective method to diminish stress by reducing the level of stress hormones like cortisol and adrenaline. Laughter also boosts the levels of serotonin and endorphins and also relaxes muscles, reduces blood pressure and improves the immunity [48]. On the contrary, poor self-esteem may cause recurrent increases in cortisol levels [49]. The role of friends and social interactions is imperative in maintaining high self-esteem and a healthy outlook on life. Loneliness and low self-esteem are allied with larger cortisol responses as well as sleep problems [50].

One need to have a more purposeful or focused life, and spend time reflecting each day on our values, and deliberately act on them. Same time it is also important to use all the personal gifts and talents to benefit others. Mental training and meditation or positive thinking, can influence our insights and make us feel calmer, resilient and happier. Researchers suggested that several additional helpful attitudes like forgiveness, gratitude, and kindness and changing the emotional responses by, altering the situation and shifting our attention together with re-framing our perspective also helps to lead a better life free of worries [51].

**Conclusion**

Stress and anxiety are an inevitable part of life. Inefficiency (the loss of mental alertness) and fear (to imagine that our actions always have a painful consequence) are the two components of anxiety. Stress affects all of us and our wellbeing in many ways. Acute manifestations of stress primarily affect the body while chronic stress will eventually have hostile consequences on the mind. Acute and chronic effects of stress are allied with several diseases and therefore it is important to recognize the symptoms. Hence it makes sense to start with them right away for societal, familial and individual benefits. But if you are struggling with moderate to severe depression or anxiety, also seek professional help right away.

**Reference**


