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Review Article

Stress in our lives and Bioprotectants from Indo-Tibetan Medicine

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Abstract

Recognition of "stress" as a condition did not occur until the relatively recent 1930s when the Canadian Dr. Hans Selye described its mechanism and named the phenomenon [1]. Stress has permeated our lives since the beginning of human history. A stress reaction is a response to danger and one's ability to deal with the oppression to survive life's stressful challenges. In the early days, the inability to deal with stress usually resulted in death or elimination from meaningful participation in the tribal life of our ancestors. A little and a lot has changed in thousands of years. Instead of the terror of predatory animals, the glut of information today due to our ever-technologically advancing society challenges our psyche and body equally, if not more. Too often, too many resign to stress without knowing what impacted and compromised our health and lives. This article addresses contemporary stressful conditions and effective means to prevent stress.

Keywords: Tibetan medicine; Ayurveda; Stress; Immunology; Neuroimmunology; Adaptogens; Bioprotectants; Curcuminoids; Adaptrin; TurmericImmune; Serenity-151; Vigor-149

Introduction

We now recognize that stress harms an organism much more than just causing an unpleasant feeling of oppression. The relationship between psychological stress and the functioning of the immune (defense) system encompasses a new branch of medical sciences called Psychoneuroimmunology. Although there is considerable individual variability in response to psychological stress (depending on specific ways of coping with stress), there is substantial evidence that stress profoundly affects the immune system. It takes a toll on the body's defenses against disease, especially evident during the biological challenge, as exemplified in infection with the flu virus or recently highlighted coronavirus. Psychological coercion is the most common form of stress experienced by most of us, and this article will briefly discuss implications on overall health, the mechanism, and its prevention.

Does Psychological Stress Compromise the Body's Defenses?

Some forms of distress are apparent, while others are stealthy. In both instances, however, psychological stress triggers an emotional response that can negatively affect the immune system in the long run. Mental depression is an example of apparent psychological distress, with the intensity of depression directly

correlated to immune system impairment [2]. In long-standing mental depression, there is a reduction of lymphocytes (sub-type of white blood cells), as well as their immune functions, especially reduction of natural killer (NK) cell activity. The NK are specialized lymphocytes that counteract cancer cells and challenge the invasion of the host by bacterial, viral, and parasitic pathogens.

Less prominent is the role of stress in health deterioration in chronically subdued people, as are spouses who care for their loved ones suffering from devastating terminal diseases (e.g., neurodegenerative conditions, cancer) [3]. Those individuals usually show poor response to flu vaccination as one of the essential manifestations of impairment of their immune system, and they often experience higher rates of illness, including influenza virus infection. They frequently complain about chronic tiredness, usually not correctly diagnosed or adequately treated. Aging brings dramatic and negative changes in our lives (retirement, loss of an active role in society, abandonment, loneliness), and these situations are likely to cause high stress [4]. Chronic worry and persistent fear compounded by affective disorders and clinical depression are common with aging. They could be responsible for the reported decline of immune functions with aging and may explain why the incidence of autoimmune, infectious, and neoplastic diseases increases with age. Statistically, pneumonia and influenza together constitute the fourth leading cause of death among persons aged 75 years or older. Age-related vulnerability of the immune system combined with greater susceptibility to psychological stress may be one of the major causes (and least recognized) for the increasing rate of diseases with aging, including increased susceptibility to the flu virus and, most recently, coronavirus infections.

Many examples in our lives point to the fact that psychological stress is not just a transient to-be-ignored nuisance but a mechanism that affects our health and well-being at all age groups, statuses in life, and occupations. A study of newlywed couples on how marital conflict-resolution behaviors affect hormonal and immune functions showed hostile or stressful behaviors during marital conflict associated with increased stress hormone levels and deterioration of the immune system over the subsequent 24 hours [5]. These findings suggest that stressful marital interactions leave an immediate and lasting impact on endocrinological and immunological functions in young people. Even those with "extraordinary" professions, like astronauts, are prone to stress, which can impact their immune systems. Immunological analyses conducted during and after preparation for space flight indicate that space flight can blunt astronauts' immune responses [6]. This information allowed careful planning of pre-flight and flight health regimens to prevent potentially dangerous microbial infections among the spacecraft crewmembers.

One of the most underdiagnosed, not even recognized as an abnormality by people affected by this condition, is social anxiety disorder (SAD) [7]. Although social anxiety disorder can cause a significant impairment in social and occupational functioning, too often, it is ignored by us and excused as mere shyness. However, this condition (prevalence 11.1-15.5%) builds stress and gradually deforms overall health if not recognized and treated. Social anxiety disorder can manifest in an excessive fear of public speaking, excessive fear of scrutiny, and fear of acting in a way that will be embarrassing. Social anxiety disorder has an early onset in most patients and tends to manifest during adolescence. Unfortunately, many patients do not receive therapy until a related condition (e.g., depression, panic attack, and substance abuse) manifests later in life. Sadly, one of the fastest-growing groups whose health is affected by stress are children and young adults [8]. Stress-related problems in children can manifest in an unusual way, e.g., complaints of abdominal pain, urinary frequency, headaches, or truancy. These symptoms can be easily mistaken for medical problems and treated without addressing the real cause of the problem. Their parents, guardians, and teachers often overlook the sources of stress in children's lives. According to a recent survey, one of the biggest stressful concerns among children was that their parents may become sick, divorce each other, or become angry with them. Children subjected to mental and emotional stress, like those raised in orphanages, single-parent homes, or neglectful homes, often have elevated levels of stress hormones and impaired immune responses.

Youngsters from unstable homes develop health problems related to stress effects on the body very early in life. Family-related stress, compounded by academic stress, has a measurable negative impact on immune functions. For example, evaluation of the immune functions in students at the beginning of the academic year and the day before final examinations showed that the lymphocyte proliferative response and production of immune mediators were negatively affected by stress caused by examination anxiety.

Psychoneuroimmunology: Stress Vs. The Immune System

As shown above, emotional and mental stress can be due to a variety of psychological stressors affecting people of all ages and professions. Regardless of the stressor, the organism's response to stress is similar and measurable. The emotional reaction to oppressing situations stimulates the sympathetic nervous system (SNS) and the hypothalamic-pituitary-adrenal (HPA) axis. This mechanism elevates survival "fight or flight" hormones like adrenaline and noradrenaline, which trigger the acute-phase response of the immune system. The acute-phase response occurs when there is no time to mount a specific immune defense against injury, and it suppresses specific immunity while rapidly elevating the production of acute-phase proteins (APP) in the liver. APP recognizes microbes and abnormal cells/tissues and non-specifically activates the immune system to fight infection or injury. The immune system's acute-phase response also mobilizes mediators of inflammation such as TNF-alpha, IL-1, IL-8, or IFN-gamma, as well as "foot soldiers" or macrophages and previously mentioned NK cells. The chain reaction, which produces an acute-

phase response, originates in the central nervous system and affects the immune system.

In principle, Dr. Hans Selye's work described the complexity of the organism's response to stress, discovering the neuroendocrine (neurohormonal) and body defense systems' interactions during stress. He found that the organism subjected to stress responded with a three-stage reaction that involved the following:

1. General alarm reaction (characterized by enlarged lymph nodes, spleen, and adrenals, depleted of cortisol and vitamin C),
2. Resistance (characterized by normalization of symptoms seen in the previous stage), comparable to quiet before the storm and
3. Exhaustion (characterized by symptoms similar to the alarm reaction stage) leading to chronic disability or death.

The "fight or flight" and acute-phase reactions may initially be lifesaving (e.g., against sepsis or massive bacterial infection); once they progress into a chronic stage, the ability of the organism to cope with stress will soon become exhausted. Chronic stress will compromise the body's ability to self-defense, leading to exhaustion of the organism described in stage "3" by Selye. Therefore, containing acute-phase reactions is essential in harnessing stress and preventing its progression beyond its helpful role. Natural mechanisms extinguishing acute-phase response occur via the production of anti-inflammatory (antidote) mediators such as IL-10, IL-4, and IL-13 and an increase in the levels of steroidal anti-inflammatory hormones (e.g., cortisol). Too often, however, the natural anti-stress mechanisms fail, and this causes a persistent elevation of steroidal hormones beyond its usefulness. This outcome leads to significant immunological, cardiovascular, and metabolic deterioration, giving an origin to a disease process.

The Pressing Need for Ways to Deal with Stress

Dealing with stress as a severe risk factor for any disorder or disease compromising our health should be a high priority for early diagnosis and intervention to prevent the effects of chronic stress on our overall health and well-being. Selye, who first scientifically described the role of stress in our lives, also noted the importance of controlling stress by building up and maintaining the nonspecific adaptation energy needed to harness stress and its harmful effects on our body's natural defense mechanisms. Time-proven means and methods derived from traditional and ancient health care systems operate by directly or indirectly increasing the adaptation energy to cope with stress by preventing the HPA chain reaction. Our predecessors dealt with stress intuitively while seeking means to relax the mind and body. Some ancient cultures developed enduring techniques to cope with stress, like meditation, yoga, or Tai-chi exercise. The traditional medical systems of the Orient, Ayurveda, Chinese, and Tibetan medicines introduced the most comprehensive approaches to dealing with stress. Those medical traditions purposefully used a group of rejuvenating herbs and minerals named Rasayanas, translated to vitalizers from Sanskrit, that generate our body's energy called TUMO, neutralizing stress-related conditions in the Tibetan language.

The concept of Rasayanas inspired the contemporary idea of an adaptogen. This term was proposed in the 1950s by Russian scientists Lazarev and Brekhman of the Russian Institute of Marine Biology, Vladivostok. In his book titled "Man and Biologically Active Substances," Brekhman describes the ideal characteristics of pharmacological agents considered as adaptogens:

Safety of the adaptogen's action on the organism.

1. A wide range of regulatory activity but manifesting its action only against the actual challenge to the system.
2. Act through an increase in nonspecific adaptation energy (resistance) to harmful influences of a vast spectrum of physical, chemical, and biological factors causing stress and
3. Has a normalizing action irrespective of the direction of the preceding pathological changes.

Based on the original research started in the 1990s, a term "bioprotectant" was introduced to describe any compound that would protect the integrity of the body's cells, tissue, and organs by preventing Selye's stress mechanism and intervening to stop the stress effects. Research of the Rasyana compounds derived from turmeric root (Curcuma longa, Fam. Zingiberaceae) indicates that the term "bioprotectant" is equivalent to the term "adaptogen." Still, the former may be a more practical way of explaining the approach to stress management [9].

In conclusion, although increasing stress is an inevitable hazard of modern life, we have ways to help ourselves in dealing with stress. The critical point is to realize the urgent need to address the stress issue in our lives and start meaningful steps to defuse stress before it takes over our psychological and physical resilience at various organ and system functions. Compound herbal and mineral formulae, e.g. Adaptrin ® (cardiovascular health), Serenity-151™ (circadian-rhythm health), Vigor-149™ (reproductive health), and a standardized water extract of TurmericImmune® (healthy telomere functions), exemplify bioprotectants that can predictably enhance the nonspecific adaptation energy or resistance to stress, which otherwise could damage some of the vital homeostatic mechanisms in the body, including the cardiovascular, immune and metabolic systems [10-13].

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Conflict of Interest

No conflict of interest.

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