

The physiological impact of physical activity on psychological stress

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ABSTRACT

Stress is one of the single most significant factor for many physical and psychological dilemma. Long-term exposure to stress or chronic stress can lead to serious physical and psychological problems such as headaches, fatigue, depression, anxiety, stomachache, heart problems, chest pain, asthma, hypertension, liver dysfunction, diabetes, arthritis, suppressed immune system, skin conditions, irregular menstrual cycle, infertility, accelerated aging process, and premature death. As under perennial and /or continual stress condition the body releases excessive cortisol hormone that results in aforementioned issues. Physical activity may be beneficial for mental and physical body system. Under intense or endurance

exercise however increase total cortisol released levels far above the moderate training modalities which can be a destructive factor for people under extreme negative stress and can make worse stress health risk conditions. Thus, caution is needed to be considered for people with negative stress. Nonetheless, according to the American physical activity guideline 10 minutes moderate aerobic exercise such as walking in division of 2×10 min or 3×10 min per day that can be performed throughout the week, seems to be a helpful alternative for all adult in part people with psychological negative stress. **Key words:** stress, physical activity, health

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INTRODUCTION

Stress is a normal physical and emotional response to events that make a person feel threatened and upset. When the body perceives a threat, nervous system in an emergency action that is called “fight – or – flight”, responds by releasing a huge amount of stress hormones, including adrenaline and cortisol in blood stream which result in faster heartbeat, rapid breathing and more oxygen consumption, higher blood pressure, muscles stiffness, back and shoulder muscular pain in short-term period [1]. Knots in the in the shoulders and neck muscles can restrict blood flow to the heart and other major organs which can lead to poor circulation and high blood pressure [2]. Long-term exposure to stress or chronic stress can lead to serious physical and psychological problems such as headaches, fatigue, depression, anxiety, stomachache, heart problems, chest pain, asthma, hypertension, liver dysfunction, diabetes, arthritis, suppressed immune system, skin conditions, irregular menstrual cycle, infertility, accelerated aging process and premature death (Figure 1) [3,4,5].



Figure 1. Stress cycle

Research have equally suggested that stress can make worse certain symptoms of diseases [6]. Chronic stress also can specifically cause to unhealthy eating in forms of both increased appetite in terms of overeating that leads to weight gain or a lack of appetite and not eating enough that cause to weight loss [7]. In this respects, researches show that chronic stress can not only increase absolute cortisol levels, but more importantly it disrupts the natural cortisol rhythm from hypothalamus in some persons.

Cortisol is normally released in a specific rhythm throughout the day that is high in the mornings in which helps individual to get out of bed and start the day and gradually taper off throughout the day, so that people feel tired at bedtime and can fall asleep [8]. High levels of cortisol results in increased appetite, causing a person to overeat that called stress eating in some cases [9,10]. Consequently the blood sugar raises, glucose gets into cells harder that makes cells less sensitive to insulin in which increases fat storage in part in belly and liver that raises the level of fatty acids and triglycerides in the bloodstream resulting hormonal imbalance such as reduced TSH levels that leads to reduction the ability in fat burning whereby makes individual obese and talented to the diabetic specially type 2 diabetic [10,11]. Some other people in contrast who are under lot of stresses due to extreme anxiety feel fullness at the most of time and may simply forget to eat, due to putting food as a low priority compared to other events in their lives that leads to skipping meals and often results in weight loss in which can have serious consequences on health such as hypothyroidism or underactive thyroid for example [7]. As previously mentioned, under stress condition the body releases excessive cortisol hormone which inhibits thyroid-stimulating hormone (TSH) in the pituitary gland that can also inhibit conversion of the thyroid hormone T4 into T3. Low level of T3 leads to hypothyroid symptoms that is cased for several other body health disturbance such as continuously fatigue, difficulty breathing, musculoskeletal disorders, osteopenia, osteoporosis and more seriously coma may result [12-14]. Therefore, ongoing stress can be detrimental and can cause serious harm on bodily system but recognizing the stress' roots and managing stress can greatly improve the quality of life as negative attitudes impact on all aspects of the physical, spiritual, and mental wellbeing so finding healthy as well as positive ways to deal with stress will aid to the overall well-being [15]. Hence, to effectively manage stress, it is best to devote attention to all aspects of life, including spiritual, social and physical demands [16]. Further, eating a healthy diet in the form of a balanced nutritional diet can be so beneficial since a well-nourished body is better prepared to cope with stress throughout the day [17]. Also, according to the American Heart Association (AHA), physical activity can improve the quality of life mentally as well as physically, so that can lower the overall negative stress level but how much exercise is needed to reduce stress? And what type of exercise can help with stress? [18]. Hence, practically specific guidance may require to great deal with negative stress toward a positive outcome and changes.

The physiological effect of physical activity on stress related factors

Physical activity increases general health and well-being through improving sense of self-esteem which accounts as a psychological key benefit of exercise [19]. During exercise the brain produces endorphins a neurochemical substance that act as natural painkillers to improve to decrease overall levels of tension, elevate mood and improve sleep [20]. Cortisol hormone equally releases from the adrenal glands in response to physical stress. In response to the moderate to intense training, cortisol makes fuels to use through a process that called gluconeogenesis to generate new glucose in the liver whereby glycogen (storage form of glucose) levels increases thus increasing blood glucose. In addition to this process, cortisol increases muscle protein breakdown and fat from adipose tissue into bloodstream, depleting the energy storages to release these fuel to produce energy during physical activity [21]. In fact, exercise represents a physical stress that challenges homeostasis [22]. It is believed that ,exercise habits is kind of protection from harmful effects of negative stress on physical and mental health and preliminary evidence suggests that physically active people have lower rates of anxiety and depression than sedentary people but causality is not clear [23,24]. Undue intense or endurance exercise however increase total cortisol released levels far above the moderate training modalities which can be a destructive factor for people under extreme negative stress by itself because chronic stress elevates cortisol hormone separately. This mixed of high level cortisol due to chronic exercise and negative stress dramatically will result suppression in immune system, bone loss, loss of menstrual cycle, Type 2 diabetes and hypertension [25,26]. This is why U.S. physical activity guidelines for Americans in 2007 and 2008 years stated that “to promote and maintain health, all healthy adults aged 18 to 65 years old need moderate-intensity aerobic physical activity 30 min on five days each week or vigorous-intensity aerobic physical activity for a minimum of 20 min on three days each week or an equivalent combination of moderate - and vigorous-intensity aerobic activity. They also recommended that “ moderate aerobic activity can be performed in episodes of at 10 minutes, and preferably, it should be spread throughout the week” [27,28]. The last section of American physical activity recommendation has significant meaning, although it points out to all healthy adults, yet it can apply to the clinical condition such as psychological stress since it can be perform at episode of 10 min in the form of 2×10 min or 3×10 min per day at several days per week that seems to be a helpful strategy in a controlled level for

a person with negative stress. Among different mild to moderate exercises walking as a simple natural activity can help to reduce stress since gives individual time to think as well as time to get away from stressors [29]. In fact, the power of walking as a stress-reliever and mood enhancer is often underestimated [30].

CONCLUSION

Stress is one of the single most significant factor for many physical and psychological dilemma. Long-term exposure to stress or chronic stress can lead to serious physical and psychological problems. Physical activity increases general health and well-being however intense exercises could be harmful for individual who under extreme stress and caution is need to be considered for exercise applications among people with negative stress. As intense exercises can increase total released cortisol levels far above the moderate training modalities that can be a destructive factors for people under extreme negative stress and make worse stress health risk conditions in them.

Conflicts of interest

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