

Human Mind in Stress Condition and Its Effect on Digestion

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ABSTRACT

There is a strong connection between the human brain and Digestive system. The human stress situation is the leading factor of irregular digestion, and the altered gut motility which causes various gastrointestinal conditions, like IBS, IBD, peptic ulcers, and GERD.

Keywords: Stress; Depression; Anxiety; Digestive System; Irritable Bowel Disease; Gastrointestinal Tract (GIT); Peptic Ulcer Disease; Cancer

Introduction

What is stress? The term Stress is defined as a human mental health condition which is a desperate threat by different human actions in the surrounding that causes mental health issues. According to the Selye in 1930s, it is caused by physical or psychological actions occurring within the body or outside the world. It is defined as a syndrome of nervous irregularity which causes the disruption of digestive functions and indirectly effects the homeostasis in the body. There are various gastrointestinal disorders that are caused by physical and psychological stress conditions. The most prominent ones are the peptic ulcer, inflammatory bowel disease (IBD), irritable bowel syndrome (IBS), and gastric cancer. Moreover the food antigens adverse reactions, peptic ulcer, and the disease of gastro oesophageal reflux (GERD). To investigate the effect of stress on the digestive disease, it is studied that depression and human stress condition are the emerging factors of the digestive diseases. The functional gastrointestinal disorders and IBS are typically intensified by stressful life events such as mourning, relocating, breaking up of close relationships, or getting a new job [1,2].

Types of Stress

There are various types of stress conditions on the bases of sources, actions, responses and duration.

Acute Stress: It is the type of stress that is short-termed but typically results from an immediate challenging situation. In this situation the body responds to fight-or-flight, that leads to momentary physiological changes in the body such as heart rate increases and release of adrenaline [3].

Chronic Stress: The prolonged stress condition over an extended period of time. It Leads to the exposure to the chronic stress which lead to physiological, and the psychological effects in the body, increasing risk of various health problems such as anxiety, cardiovascular disease, and depression.

Environmental Stress: The stress situation that occurs due to challenging conditions in the surroundings, including pollution, overcrowding, and unsafe living conditions. These stressors cause harmful effects on physical and mental health.

Psychological Stress: The cognitive or emotional stress condition, such as worries, negative thoughts, perceived threats, and work-related pressures, academic expectation. These stressors can have harmful effects on physical and mental health, causes the sense of anxious or uneasiness.

Physiological Stress: It refers to the body's response to internal or external stressors that disturb homeostasis. Such as illness, injury, sleep deprivation, or nutritional deficiencies, which activate physiological stress pathways and negatively affect health and well-being.

Stress Effects on Digestive System

Numerous studies say that stress situations can have a great effect on the pancreatic secretion and gastric secretions, impair gastro-duodenal motility, interruption gastric emptying, and change intestinal transit. Stress is believed to be an important factor in the beginning, maintenance, and regulating the symptoms associated with activating digestive disorders because of significant effects on pathophysiological processes of digestive motility [3]. Stress also badly affects the normal function of GI tract. Studies have shown that the GI system is affected by stress and it affects the absorption process, mucus and stomach acid secretion, function of ion channels, and GI inflammation [4]. According to Kiliaan, many inflammatory diseases, such as the Crohn's disease and other ulcerative-based diseases of the GI tract, are associated with stress. It has been suggested that even childhood stress can main to these diseases in adulthood. Short-tempered bowel syndrome, which is a disease with an inspiring origin, is highly related to stress.

Stress and Peptic Ulcer Disease

The first description of an association between stress and peptic ulcer disease was in men with supervisory jobs, who had a higher ulcer prevalence than executives or craftsmen. Cobb and Rose found that air traffic controllers were almost twice as likely as civilian copilots to have ulcers, particularly those with higher stress levels in their workplace. Duodenal ulcers have been found more frequently in prisoners of war during follow up than in non-captured veterans of the Vietnam War. In a study of 30 children with peptic ulcers who were compared with 30 matched controls, the ulcer group was found to have more frequent emotional disturbances and traumatic life events preceding the onset of illness. Feldman et al. observed that patients with peptic ulcer disease perceived their life events more negatively than others [5]. Societal stress provides a unique, indirect way of determining the relationship between stress and ulcer disease. Societal stress derives from an event that affects the whole society or a large part thereof, and if stress plays a role then such an event should increase the ulcer rates in the affected population. Incidence of ulcer disease has been found to increase during periods of mass population movements, during early urbanization of society and during military training [5].

Stress and Irritable Bowel Syndrome

Majority of stressful life conditions are mostly compared to patients with IBS with healthy subjects and the patients with UC. Various studies have shown that more than 66% of patients with IBS (and more with chronic functional abdominal pain) have a current Axis I psychiatric diagnosis, and this is much higher than organic medical disease controls. Rates of childhood sexual abuse and any lifetime sexual victimization are reported in 32–44% of patients with IBS in the developed world, patients with a history of abuse are more likely to report their symptoms and seek medical help. For the patient, a history of abuse translates into 65% greater pain scores, threefold more days spent in bed, significantly greater psychological distress and poorer daily function, and 30% more physician visits and lifetime surgeries. In referral centers, there is a higher frequency of abuse history seen among patients with persistent or refractory symptoms and a lower frequency among patients seen in primary care settings [2]. An increased prevalence of functional GI complaints is also found in prisoners of war and former hostages.

Recently, military personnel who returned from the Persian Gulf War with GI complaints were found to exhibit similar visceral hyperalgesia to patients with IBS. Lydiard et al found that people with a history of panic disorder and panic attacks were more likely to endorse FGI symptoms, especially those associated with irritable bowel syndrome, than were people with other psychiatric disorders [6]. Considerable evidence suggests that certain affective disorders, in particular anxiety disorder and panic, occur with greater frequency in individuals with IBS symptoms, regardless of whether these individuals seek medical care for their abdominal symptoms. In addition, it appears that the higher prevalence of depression in chronic clinic attenders reflects, at least in part, the enhanced health care-seeking behavior of patients with depression [7]. IBDs, including Crohn's disease and ulcerative colitis, are disorders of the mucosal immune system in the GI tract. These are remitting and relapsing disorders mainly caused by chronic T-cell activation resulting in inflamed tissue, pain and malabsorption. While stress is not thought to be involved in the disease pathogenesis per se, perceived stress is a predictor of the extent of the subsequent inflammation in these patients (Sexton et al., 2017) and increased stressor exposure or perceived stress increases the risk of disease relapse.

Similarly, symptom severity was related with either more stressful life events or higher perceived stress in recent studies using paediatric and adult IBD patients. This is in line with preclinical work which indicates that chronic restraint stress exacerbates colitis induced by dextran sulfate sodium in mice (Chen et al., 2021; Gao et al., 2018). Importantly, while the general mechanism mediating visceral pain in IBD patients is thought to be related to immune activation, up to 62% of IBD patients suffer from pain whether the disease state is in remission or relapse. This indicates that other mechanisms besides

active inflammatory pathways play a role in abdominal pain in IBD. Currently, IBD is managed predominantly by medication and surgery that target the pathophysiology of the disease (Lamb et al., 2019). Both the disease and its management significantly impact patients' quality of life, imposing considerable psychological, social and financial burdens (Popov et al., 2021). Since preclinical evidence strongly supports a role for stress and lifestyle factors in disease severity in models of IBD, and the available clinical evidence indicates that lifestyle intervention may provide some benefit for patients with active disease, additional research is warranted to better understand the therapeutic potential of better managing stress and other lifestyle factors for disease severity and remission [8].

Stress and Gastrointestinal Reflux Disease (Gerd)

Gastroesophageal reflux disease is a disorder in which stomach fillings gently reflux into the oesophagus. Numerous risk factors, particularly smoking and obesity, influence GERD, and the disease's pathogenesis has been shown to be a very complicated stressor. Stress could also reduce the effectiveness of treatments for GERD patients. Furthermore, stress can be a precedent for functional dyspepsia and heartburn, which can match the symptoms of GERD without the fundamental pathophysiology of GERD. While stress is a known associated factor for Gastroesophageal reflux disease (GERD), the pattern in which stress affects the different symptoms of GERD, and the dynamics between stress and GERD are not fully researched or understood. Knowing these dynamics will help physicians pick up patients who suffer from stress-related functional dyspepsia and heartburn, or GERD patients whose symptoms are induced and aggravated by stress, thus allowing effective management of them. Furthermore, studies have found that patients who had symptomatic erosive GERD on endoscopy had higher levels of anxiety, as opposed to asymptomatic patients who were incidentally found to have erosive esophagitis. It is possible that stress can increase sensitivity and lower the threshold of pain, making the distinction between symptomatic and asymptomatic GERD.

Stress and Cancer

There have been many studies on the association between stress/depression and cancer. Cancer is a heterogeneous disease group with various causes, including chemical carcinogens, immunological, psychological, and behavioural factors [2,9,10]. Previous studies have revealed that emotional stress can increase the risk of cancer [1-3]. Also, the prevalence of depression among cancer patients is known to increase with disease severity and symptoms [1,2]. However, the association between depression and subsequent cancer incidence is still unclear, although severe and chronic depression may be linked with elevated cancer risk. Our study revealed that depression was an independent risk factor for gastric adenoma and carcinoma. This result shows that depression may be linked with elevated stomach cancer risk. Changes of eating habits or lifestyle due to depressive

symptoms might affect the development of gastric tumor. This may be an indirect cause of developing gastric tumor in depressed patients. However, depression can also directly cause gastric cancer.

Previous studies revealed that the activation of the hypothalamic-pituitary-adrenal (HPA) axis in patients with depression probably impairs the immune system and contributes to the development of cancer [1,9]. However, depression was not a predictor of colonic neoplasia in our study; this is probably because of the high incidence of tiny colon adenoma and the relatively very small number of colon cancer. On the other hand, there was no association between emotional stress and GI cancer incidence [2]. Studies have shown that cancer patients are more likely to experience depressive emotions, with a prevalence of emotional disorders in the tumor population approaching 40%. Patients with cancer may have a shorter survival time and a lower quality of life when depressed [11].

Conclusion

We conclude that exposure to stress (especially chronic stress) is a major risk factor in the pathogenesis of different diseases of gastrointestinal tract including gastroesophageal reflux disease (GERD), peptic ulcer, functional dyspepsia, inflammatory bowel disease (IBD), irritable bowel disease (IBS), and other functional disorders of GI tract. The dysregulation of brain-gut-axis plays a central role in the pathogenesis of stress-induced diseases. Maintaining your digestive health is important as it reduces risk for development of gastrointestinal disorders. If the body is constantly in a stressful state and cortisol levels remain extremely elevated, problems with the digestive system may arise. It can also lead to development or exacerbation of various gastrointestinal disorders such as IBS, IBD, GERD, and more [12-15].

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