

# Psychological Stress as a Risk Factor for Low Back Pain: A Review Article

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## Abstract

Low back pain (LBP) is one of the most common complaints of pain in the settings of primary care. It affects the posterior region of the trunk that surrounds the first to fifth lumbar spine posteriorly. One of the most common mechanisms of LBP is excess muscle use in the posterior lumbar region that can promote the activation of nociceptors and cause pain. There are many risk factors that may lead to LBP which are classified into three types: individual, psychosocial, and occupational. One of the psychosocial risk factors of LBP is psychological stress. Based on the review over previous articles, psychological stress plays a role in the occurrence of LBP through excess cortisol and pain perception. There are also studies that stated a strong correlation between psychological stress and LBP.

Keywords: psychological stress, low back pain

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## 1. Introduction

Low back pain (LBP) is a common complaint found in primary care settings. Patients usually describe LBP as tenderness, stiffness, or discomfort between the inferior twelfth costal margin and the gluteal fold [1]. Painful symptoms of LBP are usually felt most in the first to fifth lumbar region, which is the center of body mass especially during trunk movements [2]. LBP can also spread along the path of the sciatic nerve from the hips to the lower extremities. The spread of LBP to the lower extremities is called sciatica [3].

Heavy activities involving muscles of the lower back may cause ischemia and inflammation due to the excess mechanical burden. This excess use of muscles can promote the activation of nociceptors, which may lead to pain and muscle spasms. Eventually, patients will be reluctant to use their painful body parts, leading to physiological changes in said parts. [4]

LBP cannot be seen as a disease of its own, but rather a symptom of other disorders with a lot of underlying factors. These factors are pain mechanisms, pain tolerance, comorbid, psychosocial factors, and biophysical factors. In LBP, more pain does not always mean more severe conditions and clinicians often could not find the etiology of a patient's back pain, which makes LBP often considered as a degenerative process [5]. Although clinical diagnosis usually cannot identify the exact nociceptive source of the pain, most researchers agree that most of the time LBP comes from a pressure in the dorsal root ganglia or degenerative process involving the intervertebral discs [6].

Clinicians usually classify LBP into three types based on its duration: acute, subacute, and chronic. Acute LBP occurs for less than six weeks, subacute LBP occurs for between six weeks to three months, and chronic LBP happens for more than three months. Around 20% of all acute LBP progressed to chronic LBP with persisting symptoms for a year. [1, 2]

There are several risk factors for LBP which are classified into three groups: individual, psychosocial, and occupational. Individual risk factors consist of age, physical wellness, obesity, pain intensity, and smoking behavior. Psychosocial risk factors include psychological stress, anxiety, impaired cognitive function, negative emotions, and depression. Occupational risk factors consist of risky physical movements, vibrations, and low satisfaction for one's occupation [1]. This article aims to discuss previous studies regarding one of the psychosocial risk factors of LBP which is psychological stress.

## 2. Psychological Stress

Stress can be defined as a bodily reaction to changes that need physical, psychological, and emotional adaptations. Psychological stress may occur in a wide spectrum of situations, especially in frustrating, nervous, and anxious events. Psychological stress can be caused by external events such as moments of grief, or by an individual's internal perception of external events. These factors then can result in anxiety, negative emotions, mental pressure, pain, and sadness, which may be harmful for an individual's biopsychosocial activities. On the other hand, psychological stress also has its own benefits. Due to the mental pressure rooted from previous stressful events, someone may be motivated to strive and do better in the future for the sake of not reliving their old trauma. [7, 8]

From a biological point of view, some organic factors in the body such as hormones, neuroendocrine mediators, peptides, and several neurotransmitters are also involved in giving response to psychological stress. During stressful events, the body will have the tendency to secrete cortisol and sympathetic catecholamines such as epinephrine and norepinephrine. Most people perceive stress too negatively, which can lead into the release of stress hormones and substances to be secreted even in the slightest stress events. As a result, in several individuals with biological susceptibilities to some diseases, persistent stress can be the underlying cause of physical illnesses. [9]

During the COVID-19 pandemic, psychological stress is very common. False information, fear-mongering, and uncertain situations cause people to develop a strong emotion which leads to stress. Psychological stress is also commonly caused by the unwillingness of people to accept new ways of life, including suppressing everyday routines and staying at home. It is reported that there was a significant number of people with previous mental illnesses who got worse during the pandemic. [10]

In a study conducted in China, it was found that 35% of the population suffered from psychological stress during the pandemic. The pandemic stress is usually manifested as sadness, tendency to be angry, and a change in lifestyle to the more risky ones. People of the age group of 18-35 years old scored the highest for psychological pressure and many believe it was because of their higher education and better knowledge and awareness about health. [10]

Based on a study by Calvarese (2015), there are significant differences between men and women in reacting to stressful events. It is believed that women are more prone to depression, frustration, and anxiety. In men, depression and other negative emotions are usually projected externally, which can lead to an over externalisation of emotions such as personality disorders and substance addictions. On the other hand, women usually project their stress internally and can result in over internalisation such as anxiety and depression. Biologically, female sex hormones can also weaken the hypothalamic-pituitary-adrenal (HPA) axis and the sympathoadrenal response, therefore they are more prone to depression than men. [11, 12, 13]

## 3. The Role of Psychological Stress in Low Back Pain

Psychological stress is one of the major risk factors for LBP. Situations with high loads of stress can decrease an individual's tolerance to back pain, which is itself a stress factor. If depression and LBP occur

simultaneously, both of these conditions can influence one another in a negative manner. It is also said that stress and depression have a role to play in the chronicity of LBP. Based on a former study in Hong Kong, people with acute back pain generally have higher rates of depression and emotional stress. The study also mentioned that there was an association between a patient's anxiety and pain intensity. [14, 15]

Self-perception of pain is also a key factor in the intensity of back pain. A former study by Mei and colleagues stated that depression can reduce the body's pain tolerance [16]. Another study by Du and colleagues found that there was a significant association between psychological stress and disability [17].

As already mentioned before, the body tends to secrete cortisol under stressful occasions. Normally, cortisol works to regulate blood glucose, suppress the activities of non vital organs in times of emergency, and as an anti inflammation. However, cortisol also plays a major role in the occurrence of psychological stress. Cortisol secretion can be increased in times of physical or emotional threats. Excessive psychological reactions to moments of threat can lead to major inflammation in the body after the reactivation of acute proinflammatory stress responses [18]. Similar changes are also shown in other studies. Stressful occasions such as pre-exam pressure in medical students, excess workload in hospital workers, or just pessimism in general can increase the secretion of cortisol. Although acute mental stress is often considered as an adaptive reaction, there are several maladaptive responses such as feeling of worthlessness that may increase the cortisol to a harmful level, both physically and psychologically [19].

In a previous study in the United States, a correlation was found between the results of Perceived Stress Scale (PSS), a questionnaire for stress levels, and the results of Oswestry Disability Index, a scoring system for low back pain. The study was conducted among medical students which showed a high prevalence of neck and back pain associated with high levels of stress [17]. Another study by Al-Shammari in Jeddah, Saudi Arabia also reported similar results, which is a correlation between psychological stress and low back pain [20].

#### 4. Conclusions

Psychological stress can play a role in the occurrence of low back pain through the pathways of pain perception and cortisol overproduction.

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