

How stress hormones affect blood sugar levels in diabetes

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DESCRIPTION

Diabetes management is a multifaceted process that requires balancing diet, exercise, medication, and regular blood sugar monitoring. However, an often overlooked factor that can significantly influence blood sugar levels is stress. Stress, whether physical or emotional, triggers the release of hormones that can affect blood sugar regulation. These stress hormones chiefly cortisol, adrenaline, and noradrenaline play a key role in the body's fight or flight response, preparing the body to respond to perceived threats. For individuals with diabetes, understanding how stress hormones affect blood sugar is crucial for maintaining stable glucose levels and preventing complications. When the body experiences stress, whether due to a demanding workday, an emotional conflict, or a physical injury, it activates the hypothalamic-pituitary-adrenal (HPA) axis. This system triggers the release of stress hormones, including cortisol, adrenaline, and noradrenaline, into the bloodstream. These hormones prepare the body to respond to the stressor by increasing heart rate, enhancing alertness, and providing a surge of energy. One of the ways the body generates this energy is by increasing the availability of glucose, which is a primary energy source for muscles and the brain. Cortisol, often referred to as the stress hormone, has a profound effect on blood sugar levels. It is released by the adrenal glands in response to stress and helps mobilize energy by increasing blood glucose levels. Cortisol does this by stimulating the liver to release stored glucose into the bloodstream and by promoting gluconeogenesis, the process by which the liver creates glucose from non-carbohydrate sources such as proteins. This can be especially problematic if stress is chronic, as sustained high cortisol levels can lead to consistently high blood glucose levels, complicating diabetes management. Adrenaline and Noradrenaline's role, these hormones work alongside cortisol to prepare the body for rapid action in emergency situations. Both adrenaline and noradrenaline trigger an increase in heart rate, blood

pressure, and blood flow to muscles, while also raising blood glucose levels. The primary mechanism by which adrenaline raises blood sugar is by stimulating the liver to release more glucose, much like cortisol. Additionally, adrenaline inhibits the action of insulin, making it more difficult for cells to absorb glucose. This effect is particularly concerning for individuals with type 1 diabetes, who rely on external insulin to regulate their blood sugar. Under stress, the body's response can inadvertently lead to elevated blood sugar levels, even if the individual is following their prescribed insulin regimen. While short-term stress responses are generally manageable, chronic stress can have a more profound and long-lasting impact on blood sugar control. Persistent activation of the HPA axis leads to sustained high levels of cortisol and other stress hormones, which can cause prolonged periods of elevated blood glucose. Chronic stress is often associated with unhealthy lifestyle behaviors such as poor diet, lack of physical activity, and inadequate sleep all of which can further exacerbate blood sugar instability. Moreover, chronic stress has been linked to increased inflammation, which plays a central role in insulin resistance. Over time, this can worsen the underlying mechanisms of both type 1 and type 2 diabetes, making it harder for individuals to maintain stable glucose levels. Additionally, people with diabetes may be more sensitive to stress, as they worry about managing their condition and the potential complications that come with it. This creates a vicious cycle, where stress leads to higher blood sugar, and high blood sugar, in turn, increases stress and anxiety.

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CONFLICT OF INTEREST

The author has nothing to disclose and also state no conflict of interest in the submission of this manuscript.

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