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Cortitrol supplementation reduces serum cortisol responses to physical stress

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Abstract

The supplement Cortitrol was formulated to mitigate the cortisol response to physiological and psychological stress. Therefore, the purpose of this study was to examine the effects of Cortitrol on serum cortisol concentrations before, during, and after a high-intensity resistance exercise protocol (EX) and a resting control day (REST). We used a matched, balanced, randomized, double-blind, placebo-controlled, cross-over design. Blood samples were obtained at matching time points during EX and REST. Cortitrol significantly ($P < .05$) reduced cortisol area under the curve concentrations during REST. During EX, Cortitrol reduced cortisol concentrations at 20, 10, and 0 minutes pre-exercise, at mid-exercise, immediately post-exercise, and at 5 minutes post-exercise. In addition, serum cortisol and plasma adrenocorticotropin hormone area under the curve concentrations during EX were significantly lower after Cortitrol than placebo. Furthermore, Cortitrol significantly reduced free radical production. This was indicated by significantly lower plasma malondialdehyde concentrations at the 65-minute post-exercise time point during REST, and at pre-exercise, immediate post-exercise, and 65 minutes post-exercise during EX. Serum total testosterone, free testosterone, dehydroepiandrosterone, and growth hormone showed exercise-induced increases but no treatment effects. These data demonstrate that Cortitrol was effective in modulating the physiological stress responses of exercise from the anticipatory rises before physical stress and into early recovery by reducing cortisol and associated free radical production.

1. Introduction

When human beings are confronted with physiological and/or psychological stress the adrenal gland secretes cortisol. This response increases glucose and fatty acid concentrations in the blood and stimulates gluconeogenesis to prepare the body for "fight or flight." Although cortisol is necessary for normal physiological function, chronic elevations have a negative impact on muscle and immune cell function and bone metabolism. Nutritional interventions aimed at partially attenuating the cortisol response would prove valuable for those faced with, for example, intense physical training, labor in the work place, or chronic physiological stress.

There are 2 components of the supplement regimen tested. The first component is a general vitamin/mineral combination of pantothenic acid (30 mg), pyridoxine (10 mg), riboflavin (8.5 mg), thiamine (7.5 mg), vitamin C (250 mg), calcium (100 mg), and magnesium (100 mg). B vitamins (pantothenic acid, pyridoxine, riboflavin, and thiamine) were added to prevent deficiencies common in active individuals [1], which have been shown to decrease $\dot{V}O_2$max, onset of blood lactate accumulation, peak power, and mean power [2]. Vitamin C supplementation has the potential to reduce blood pressure, cortisol, and subjective responses to acute psychological stress in healthy subjects [3], as well as exercise stress responses in competitive weightlifters [4]. Calcium intake is essential for minimizing bone loss and osteoporosis [5], a disease common among individuals with persistently elevated cortisol levels [6].

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Finally, chronic stress may exacerbate preexisting magnesium deficiencies, which can lead to impaired energy metabolism and decreased physical work capacity [7].

The second component of the supplement is Cortitrol, a proprietary herbal anticortisol blend containing magnolia bark extract (*Magnolia officialis*), L-theanine (from *Camillia sinensis*), *Epimedium* extract (*Epimedium koreanum*), phophatidylserine (soy derived), and β-sitosterol. Limited data exist on the effectiveness of these herbal supplements; however, preliminary studies show promising results. Magnolol, a phenolic constituent of magnolia bark, has been shown to suppress cortical serotonin (5-hydroxytryptamine) release [8], which may be advantageous because serotonin plays a role in stress and anxiety–related disorders [9]. L-theanine, commonly found in tea, may prime blood T cells and provide natural resistance to infection [10] and promote brain α-wave [11] and suppress β-wave activity [12]. *Epimedium* has been shown to lower cortisol levels in animal models [13]. Monteleone et al [14,15] showed that phosphatidylserine supplementation attenuated the cortisol response to physical stress in healthy men. Finally, subjects supplementing with β-sitosterol before competing in a marathon had a decreased inflammatory response, cortisol/dehydroepiandrosterone (DHEA) ratio, and immune suppression during the postmarathon recovery period [16].

Although cortisol is necessary to respond to physiological stress, chronic elevation of cortisol may have negative effects on a host of target tissues, such as reduced immune cell function, protein wasting in muscle, and suboptimal bone metabolism. However, complete elimination of the overt cortisol response to stress would be physiologically inappropriate for normal human health. Thus, Cortitrol was designed and formulated to reduce the magnitude of the overt stress response and absolute cortisol concentrations.

Intense resistance exercise and training has been shown to cause dramatic increases in cortisol levels [17,18]. Furthermore, athletes show elevated cortisol levels in anticipation of intense physical challenge [19]. Therefore, high-intensity resistance exercise provides an ideal forum to test the purported benefits of Cortitrol. The purpose of this investigation was to determine the efficacy of Cortitrol to influence cortisol responses to an intense physical exercise stress model in human beings known to dramatically increase cortisol concentrations in the blood. We hypothesized that

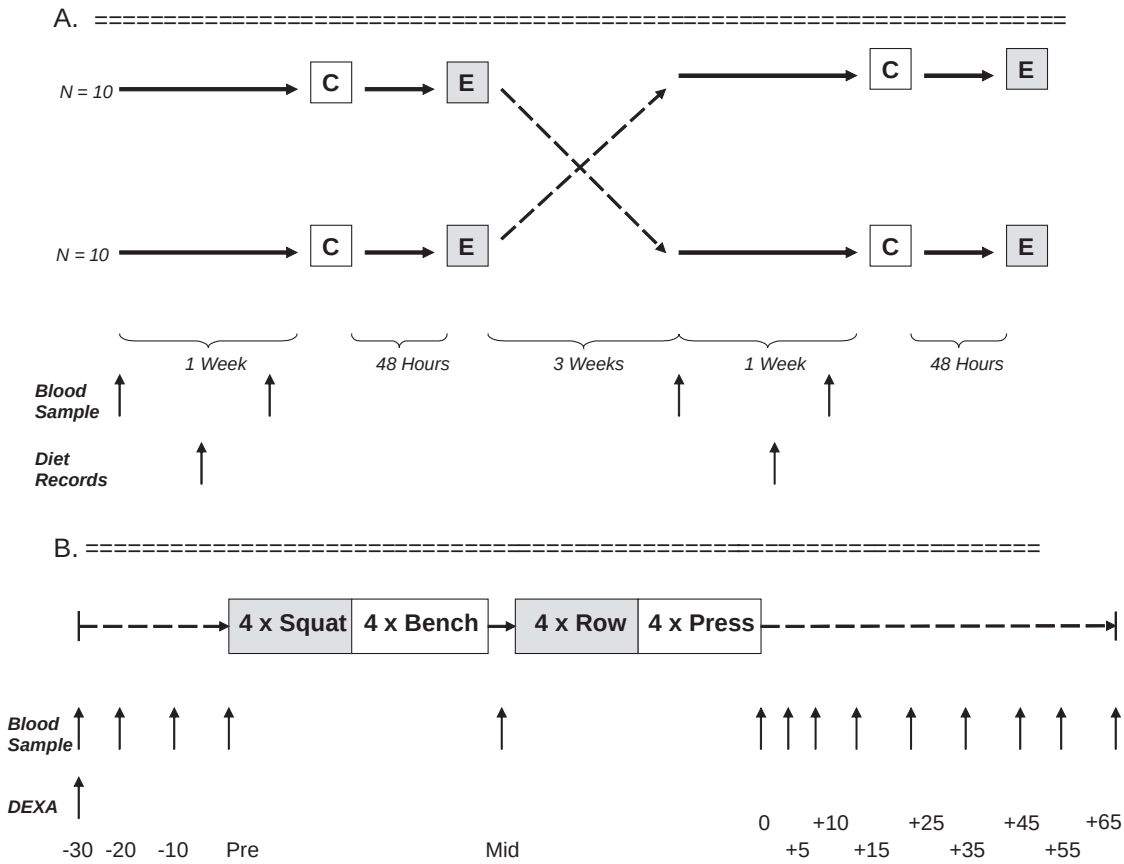

Fig. 1. A, Experimental design. A balanced, randomized, double-blind, placebo-controlled, cross-over design was used to determine the effects of Cortitrol. C indicates control day; E, exercise day. B, Testing sequence during exercise testing days. Blood samples were obtained at matching time points during resting control days. DEXA indicates dual-energy x-ray absorptiometry.