

# Acute effect of HIIT on testosterone and cortisol levels in healthy individuals: A systematic review and meta-analysis

Dote-Montero M.  
Carneiro-Barrera A.  
Martinez-Vizcaino V.  
Ruiz J.R.  
Amaro-Gahete F.J.

## Abstract

To determine the acute effect of a single high-intensity interval training (HIIT) session on testosterone and cortisol levels in healthy individuals, a systematic search of studies was conducted in MEDLINE and Web of Science databases from inception to February 2020. Meta-analyses were performed to establish the acute effect of HIIT on testosterone and cortisol levels immediately after a single HIIT session; after 30 min and 60 min (primary outcomes); and after 120 min, 180 min, and 24 h (secondary outcomes, only for pre-post intervention groups). Potential effect-size modifiers were assessed by meta-regression analyses and analyses of variance. Study quality was assessed using the Cochrane's risk of bias tool and the Physiotherapy Evidence Database scale. The meta-analyses of 10 controlled studies (213 participants) and 50 pre-post intervention groups (677 participants) revealed a significant increase in testosterone immediately after a single HIIT session ( $d = 0.92$  and  $0.52$ , respectively), which disappeared after 30 min ( $d = 0.18$  and  $-0.04$ ), and returned to baseline values after 60 min ( $d = -0.37$  and  $-0.16$ ). Significant increases of cortisol were found immediately after ( $d = 2.17$  and  $0.64$ ), after 30 min ( $d = 1.62$  and  $0.67$ ) and 60 min ( $d = 1.32$  and  $0.27$ ). Testosterone and cortisol levels decreased significantly after 120 min ( $d = -0.48$  and  $-0.95$ , respectively) and 180 min ( $d = -0.29$  and  $-1.08$ ), and returned to baseline values after 24 h ( $d = 0.14$  and  $-0.02$ ). HIIT components and participant's characteristics seem to moderate the effect sizes. In conclusion, testosterone and cortisol increase immediately after a single HIIT session, then drop below baseline levels, and finally return to baseline values after 24 h. This meta-analysis provides a better understanding of the acute endocrine response to a single HIIT session, which would certainly be valuable for both clinicians and coaches in the prescription of exercise programs to improve health and performance. Testosterone and cortisol may be used as sensitive biomarkers to monitor the anabolic and catabolic response to HIIT. © 2021 The Authors. *Scandinavian Journal of Medicine & Science In Sports* published by John Wiley & Sons Ltd.

## Author keywords

aerobic interval training; steroid hormone; time-efficient training; training methodologies