

## The Influence of Training and Competition on Cortisol Levels and Sleep in Elite Female Athletes

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**Abstract :** Stress hormone levels in a competition vs. training setting are yet to be evaluated in elite female athletes. The effect that these levels of stress have on subsequent sleep quality and quantity is also yet to be investigated. The aim of the current study was to evaluate different psychophysiological stress markers in competition and training environments and the subsequent effect on sleep indices in an elite female athlete population. The study involved 10 elite female netball athletes (mean  $\pm$  SD; age =  $23 \pm 6$  yrs) providing multiple salivary hormone measures and having their sleep monitored on two occasions; a match day, and a training day. The training and match were performed at the same time of day and were matched for intensity and duration. Saliva samples were collected immediately pre (5:00 pm) and post session (7:15 pm), and at 10:00 pm and were analysed for cortisol concentrations. Sleep monitoring was performed using wrist actigraphy to assess total sleep time (TST), sleep efficiency (SE%) and sleep latency (SL). Cortisol levels were significantly higher ( $p < 0.01$ ) immediately post the match vs post training (mean  $\pm$  SD;  $0.925 \pm 0.341$   $\mu\text{g/dL}$  and  $0.239 \pm 0.284$   $\mu\text{g/dL}$ , respectively) and at 10:00pm ( $0.143 \pm 0.085$   $\mu\text{g/dL}$  and  $0.072 \pm 0.064$   $\mu\text{g/dL}$ , respectively,  $p < 0.01$ ). The difference between trials was associated with a very large effect (ES: 2.23) immediately post (7:15 pm) and a large effect (ES: 1.02) at 10:00 pm. There was a significant reduction in TST (mean  $\pm$  SD;  $-117.9 \pm 111.9$  minutes,  $p < 0.01$ , ES: -1.89) and SE% ( $-7.7 \pm 8.5\%$ ,  $p < 0.02$ , ES: -0.79) on the night following the netball match compared to the training session. Although not significant ( $p > 0.05$ ), there was an increase in SL following the netball match v the training session ( $67.0 \pm 51.9$  minutes and  $38.5 \pm 29.3$  minutes, respectively), which was associated with a moderate effect (ES: 0.80). The current study reports that cortisol levels are significantly higher and subsequent sleep quantity and quality is significantly reduced in elite female athletes following a match compared to a training session.

**Keywords :** cortisol, netball, performance, recovery

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