

Stress Response to Winter Warfare Training: Potential Impact of Location

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ABSTRACT

Winter Warfare Training (WWT) is a critical component of military training to prepare individuals to move effectively in harsh conditions. Moving through snow and heavy terrain increases overall stress to the entire human system. **PURPOSE:** The purpose of this effort was to quantify the stress response during WWT to determine the level of physiological adaptation to extreme environments. **METHODS:** Mountain and mobility operators (age: 31.5±1.4 years; height: 71.1±0.5 inches; weight: 192.5±6.6 lbs.; body fat percentage: 18.0±5.0%) were recruited for this effort. Participants engaged in baseline laboratory metrics at their home station located in Colorado (CO) prior to WWT for one week in Montana (MT) and one week in Alaska (AK). WWT was separated by approximately one month. Blood was collected upon wake on the first and last day at each location. Plasma was analyzed for anabolic and stress-related hormones via enzyme-linked immunoassay (ELISA). **RESULTS:** Plasma adrenocorticotrophic hormone (ACTH) levels increased from baseline to pre- (p=0.004), decreased from pre- to post-WWT in MT (p=0.004), and increased in from pre- to post-WWT in AK (p=0.005). Plasma cortisol levels decreased from pre- to post-WWT in MT (p=0.001) and, conversely, increased from pre- to post-WWT in AK (p<0.001). Plasma insulin-like growth factor 1 (IGF-1) concentrations decreased from pre- to post-WWT in AK (p=0.012). Plasma insulin-like growth factor binding protein 3 (IGFBP-3) were lower pre-WWT in MT (p=0.018) and AK (p=0.002) compared to baseline in CO. Additionally, sex hormone binding globulin (SHBG) concentrations decreased from pre- to post-WWT in MT (p<0.001). Pre-WWT SHBG levels in AK were lower relative to baseline in CO (p<0.001) and pre-WWT in MT (p=0.006). The Total Testosterone/Cortisol ratio was lower pre-WWT in MT compared to baseline in CO (p=0.042). **CONCLUSION:** The increase in stress-related hormones (i.e., ACTH and cortisol) exhibited throughout during WWT in AK suggest that operators experienced heightened physiological strain during WWT in AK compared to MT, despite similar training. We speculate that differences in sleep environment, changes in environmental temperature and terrain between MT and AK, and cumulative training load may have exacerbated the overall physiological strain on the operators.