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### Systemic Low-Grade Inflammation and Associations with Sleep Disturbance in Marine Corps Officer Candidates During Training

Catherine R. Gage, Kristen J. Koltun, Matthew B. Bird, Jennifer N. Forse, Mita T. Lovalekar, Evan D. Feigel, Christopher K. Kargl, Brian J. Martin, Bradley C. Nindl, FACSM. University of Pittsburgh, Pittsburgh, PA, USA

High circulating concentrations of C-Reactive Protein (CRP), an acute phase protein and indicator of systemic low-grade inflammation, have been associated with overtraining syndrome (OTS). During periods of intensified training, this association may be driven by a lack of recovery through disturbed sleep but has not been investigated during Marine Corps Officer Candidates School (OCS). **PURPOSE** To examine changes and potential sex differences in CRP concentrations during 10 weeks of military training, and associations with sleep disturbance (SD). **METHODS** 68 OCS candidates (males  $n = 47$ ;  $25 \pm 4y$ ,  $23.2 \pm 2.1\text{kg/m}^2$ , females  $n = 21$ ;  $25 \pm 3y$ ,  $20.4 \pm 1.8\text{kg/m}^2$ ) enrolled and provided blood samples at pre- and post-OCS that were analyzed via commercial ELISA. CRP concentrations  $>3\text{mg/L}$ , a clinical cut-off for high inflammation, were classified as high CRP. The Athlete Sleep Screening Questionnaire assessed SD (range 0–17) (e.g. sleep duration and quality) during training, in 44 out of the 68 candidates ( $n = 24$  missing data). CRP data was reported as median [Q1, Q3] and was log transformed for a two-way (time\*sex) mixed-measures ANOVA. SD data is reported as mean  $\pm$  std dev and analyzed using an independent sample  $t$  test. Nominal data were analyzed using a Fisher's Exact Test or McNemar test, and a Spearman's correlation coefficient ( $\rho$ ) was conducted to assess associations. Statistical significance was  $\alpha=.05$ . **RESULTS** Median CRP levels were 0.46 [1.56, 1.42] and 2.27 [0.76, 5.48] mg/L at pre- and post-OCS, demonstrating a 2.1 [0.9, 3.4]-fold increase. No interaction effect was observed, but main effects of time and sex, where CRP increased from pre- to post-OCS ( $p < 0.001$ , partial  $\eta^2 = 0.470$ ), and was higher in female vs. male candidates ( $p = 0.025$ , partial  $\eta^2 = 0.073$ ). The proportion of candidates with high CRP increased from pre- to post-OCS (12% vs. 40%,  $p < 0.001$ ). At post, CRP was associated with SD ( $\rho = 0.358$ ,  $p = 0.017$ ). High CRP reported greater SD ( $8.3 \pm 1.9$  vs.  $6.9 \pm 1.4$ ,  $p = 0.008$ ) and compared to their counterparts, a greater proportion were categorized as having moderate-to-severe SD ( $\geq 8$ ) (63% vs. 36%), sleeping only 5-6h per night (95% vs. 76%) and dissatisfied with their quality of sleep (79% vs. 52%), though these differences weren't statistically significant. **CONCLUSION** Systemic inflammation can increase during military training, even to clinically high levels. Disturbances in sleep, a well-known attribute of military training, may be associated with this notable rise. However, the bidirectional nature between inflammation and sleep was not investigated. **SIGNIFICANCE/NOVELTY** Candidates may experience a clinically high level of systemic inflammation during OCS, which if not addressed could lead to increased risk of OTS, warranting preventative measures from practitioners and future studies to see if sleep management reduces systemic inflammation during periods of intensified training.

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