ASSOCIATION BETWEEN CARDIAC REGULATION AND SERUM TESTOSTERONE TO CORTISOL RATIO IN MILITARY RECRUITS

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Hormones and the autonomic nervous system play, through complex interaction, a crucial role in the control of stress reaction. In the beginning of military service, the change in conscript’s social environment is dramatic and stress reactions can be very high. We tested the hypothesis that the cardiac autonomic regulation, measured by the heart rate variability technique, may be associated with the balance between serum testosterone and cortisol levels during the first week of service in military recruits.

The study population included male military recruits (n=24, age 19.0±0.3 yr). Cardiac autonomic function was assessed by measuring high (HF power: 0.15-0.4 Hz) and low (LF power: 0.04-0.15 Hz) power spectral indices of R-R intervals at supine rest and during autonomic sympathetic stimulation by the controlled standing condition (5 min recordings for both) on the second and seventh morning of the military service. The blood samples were collected for analyzing basal serum testosterone and cortisol levels on the seventh morning of the military service.

During the first week of the military service mean heart rate decreased both at rest and in the standing condition (77±13 vs. 61±11 bpm, p<0.001 and 88±11 vs. 83±9 bpm, p=0.024, respectively). The vagally mediated HF power increased significantly at rest but not in the standing condition (6.90±0.85 vs. 7.67±0.85, p<0.001 and 6.07±0.86 vs. 6.25±0.84 ln ms², p=0.341, respectively). Mean serum testosterone and cortisol concentrations were 16.6±4.5 and 583±99 nmol/l, respectively. The mean serum testosterone to cortisol ratio was 0.029±0.007. The change in absolute HF power from the second to seventh day was significantly correlated with the serum testosterone to cortisol ratio in the standing condition (r=0.45, p=0.029) and the correlation became weaker at rest (r=0.30, p=0.152). Also the change in absolute HR correlated with the testosterone to cortisol ratio in the standing condition (r=0.42, p=0.041) but not at rest (r=0.05, p=0.811). The change in LF power did not correlate with the ratio of testosterone to cortisol in any condition (r=–0.14, p=0.522 and r=–0.07, p=0.730 at rest and in standing, respectively).

The present study showed that the augmented vagal outflow during the first week of the military service, documented by the increased HF power of R-R intervals and decreased HR, was significantly associated with the serum testosterone to cortisol ratio. Thus, the analysis of the autonomic function by HR dynamics could reveal subtle changes in neural regulation and possible association with serum anabolic and catabolic hormone levels in a stressful environment.