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Sympathetic arousal in response to acute and chronic stress

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Electrodermal activity (EDA) is considered as a noinvasive index of sympathetic nervous system depending on the sweat glands activity and blood vessels. The aim of this study was to assess the effect of acute and chronic mental stress on the EDA and peripheral temperature in healthy young people.
Methods: Forty young people (mean age 23.1±0.2 yr., 25 women) were examined in two periods: at the beginning of semester (P1, rest period) and one day before the last exam (P2, stress period) in the following order: rest (T1) – Stroop test (T2) – recovery (T3) – mental arithmetic test (T4) – recovery (T5) – negative emotional stress (T6) – recovery phase (T7). EDA evaluated as a skin conductance (μS) and peripheral skin temperature (°C) were continuously recorded and evaluated from each period lasting six minutes.
Results: EDA was significantly higher during acute mental stress (T2, T4, T6) and recovery phases (T3, T5, T7) compared with baseline values (T1, $p<0.001$) in both periods (P1, P2). Peripheral temperature showed inverse pattern: significantly lower during stress (T2, T4, T6) and recovery phases (T3, T5, T7) compared with baseline values (T1, $p<0.001$) in both periods (P1, P2). In chronic stress, EDA was significantly lower in the stress period (P2) compared to the rest period (P1, $p<0.001$). In contrast, peripheral temperature was without significant changes in the P2 compared to the P1.
Conclusion: EDA and peripheral temperature could represent the sensitive markers of sympathetic arousal in response to acute mental stress. Both parameters did not return to baseline values indicating a potential sympathetic excitation after acute stress. Interestingly, reduced sympathetic activity indexed by lower EDA in the stress period might indicate an allostatic overload evoked by a long-term daily intensive study in healthy students. We suggest that the altered sympathetic response can be associated with a higher risk of the cardiovascular complications in chronic stress. Support: VEGA 1/0087/14, APVV 1/0235/12.