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Changes in cortisol release and heart rate and heart rate variability during the initial training of 3-year-old sport horses

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Abstract

Based on cortisol release, a variety of situations to which domestic horses are exposed have been classified as stressors but studies on the stress during equestrian training are limited. In the present study, Warmblood stallions ($n = 9$) and mares ($n = 7$) were followed through a 9 respective 12-week initial training program in order to determine potentially stressful training steps. Salivary cortisol concentrations, beat-to-beat (RR) interval and heart rate variability (HRV) were determined. The HRV variables standard deviation of the RR interval (SDRR), RMSSD (root mean square of successive RR differences) and the geometric means standard deviation 1 (SD1) and 2 (SD2) were calculated. Nearly each training unit was associated with an increase in salivary cortisol concentrations ($p < 0.01$). Cortisol release varied between training units and occasionally was more pronounced in mares than in stallions ($n < 0.05$). The RR

additionally, was more pronounced in mares than in stallions ($p < 0.05$). The RR interval decreased slightly in response to lunging before mounting of the rider. A pronounced decrease occurred when the rider was mounting, but before the horse showed physical activity ($p < 0.001$). The HRV variables SDRR, RMSSD and SD1 decreased in response to training and lowest values were reached during mounting of a rider ($p < 0.001$). Thereafter RR interval and HRV variables increased again. In contrast, SD2 increased with the beginning of lunging ($p < 0.05$) and no changes in response to mounting were detectable. In conclusion, initial training is a stressor for horses. The most pronounced reaction occurred in response to mounting by a rider, a situation resembling a potentially lethal threat under natural conditions.



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Keywords

Horse; Initial training; Cortisol; Heart rate variability

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