

The use of a submaximal exercise test in the evaluation of equine asthma phenotypes in a mixed-breed cohort of horses

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Introduction

Despite the high prevalence of equine asthma (EA), subclinical EA remains a diagnostic challenge. Submaximal exercise tests (SET) have been used to evaluate equine respiratory health and overall fitness in various contexts. The diagnostic value of such tests in the field to diagnose and differentiate, or to exclude EA remains uncertain. The hypothesis of this study was that a SET can help with diagnosing mild, moderate or severe EA (sEA).

Material and Methods

26 mixed-breed horses were presented for a prospective cross-sectional study and classified as healthy (8), or diagnosed with mild (4), moderate (7) or sEA (7) according to anamnesis, clinical examination and BALF cytology. A SET on a lunge was performed including ECG-recording, arterial blood gas and blood lactate analysis at various time points, alongside the evaluation of respiratory (RR) and heart rates (HR), as well as the recovery times.

Results

Of all analyzed parameters and time points (T), arterial partial pressure of oxygen (pO₂) at T0 had the strongest association with diagnosis ($\tau = -.513$, LRT = 18.1, adj. p < .001). Sensitivity was greatest to diagnose sEA, generally indicated by T0 pO₂ < 80 mmHg. Post-exercise hypoxemia at T6 was evident in clinically non-asthmatic horses. In contrast, the effect of exercise on pO₂ was diverse in horses with moderate and sEA, of which some presented with increased pO₂ compared to T0. RR or HR recovery lengths did not differ significantly between the phenotypes (RR p=0.377, HR p=0.659) and demonstrated wide intra-group variation.

Discussion and Conclusion

Neither recovery time nor other parameters specific to the SET were consistently associated with diagnosis or even sEA. This is likely because response to SET is affected by training status and therefore of little diagnostic value in a heterogenous cohort including leisure horses. As a result, increasing exercise intensity is likely to exacerbate the differences in training but not to increase diagnostic sensitivity. Breed differences may also contribute to heterogeneity, as two horses with highly prolonged recovery times (one healthy, one moderate EA) were Icelandic Horses. Finally, exercise is known to improve bronchodilation in horses with EA, leading to improved oxygenation and loss of diagnostic value of pO₂ during SET.

To conclude, the parameters of the presented SET did neither inform EA diagnosis, nor did they provide adequate results to assess respiratory health or disease (clinically asthmatic or non-asthmatic) in a mixed population.

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