

Electromyographic evaluation of hindlimb muscle activity patterns in elite and non-elite jumping athletes: A preliminary report on surface electromyography data

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Reasons for performing study: Research has described differences in jump technique in experienced and inexperienced jumping horses. No studies have investigated differences in muscle activation between elite and non-elite athletes. **Objectives:** To quantify differences in hindlimb muscle activity between elite and non-elite jumping horses and whether differences in neuromuscular strategies exist between groups. **Study design:** Exploratory. **Methods:** Surface electromyography (sEMG) (2088Hz) and 3D kinematics (232Hz) were collected synchronously from elite (n=7) (age: 10.4±2.6 years, sex: three mares, four geldings, breed: Warmblood) and non-elite (n=7) (age: 9.7±1.7 years, sex: three mares, four geldings, breed: various) horses. sEMG data were collected using electrodes, placed on shaved and cleaned areas over the muscle belly of *superficial gluteal* (SG) and *biceps femoris* (BF). Horses performed six canter (average speed: 4.85±0.53m/s) and jump trials over a 1.0m fence (average approach speed: 6.20±0.58m/s). Integrated EMG (iEMG) (μV.s) were calculated for hindlimb stance phases (StP) during canter, jump approach and take-off. iEMG for each horse and muscle was normalised to the maximum iEMG observed during canter. Mixed measures ANOVA was used to examine intra-horse and inter-group differences in StP iEMG. **Results:** Average normalised SG StP iEMG (%) significantly (P<0.05) increased from 64.1±24.2 and 71.4±19.3 during canter StP to 107.6±50.3 and 166.7±95.6 during approach StP and to 439.8±182.0 and 507.0±499.2 during take-off StP in elite and non-elite groups, respectively. Average BF iEMG significantly (P<0.05) increased from canter to approach and take-off StP, with both groups exhibiting similar average iEMG for all StP. No significant differences were found (P>0.05) between groups for iEMG. **Conclusions:** Both groups employed similar neuromuscular strategies in BF during jump and canter. Although not significant, different strategies are apparent in SG between groups, with elite horses requiring less muscular effort at take-off. Increased variability in non-elite SG iEMG may account for lack of significant differences. **Ethical Animal Research:** The study was approved by the University of Central Lancashire's ethics committee (RE/13/04/SH). **Competing Interests:** The authors have declared no competing interests. **Sources of Funding:** None.