Simulator training in equestrian show jumping

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Simulator-based training

- Flight simulators for training of air pilots
- Simulators-based skills training in medicine
- Riding simulators for teaching seat of the rider, and for reconvalescent riders or riders with handicap
- First riding simulator at the *ENE Saumur* in 1987 for research and training
Simulator-based training

- New riding simulators for show jumping, dressage, polo and racing have recently become available
- Interactive and controlled by leg and rein pressure.
- Independent moving head, neck and body imitate reaction of the horse to actions of the rider
- “Jumps” obstacles viewed on an interactive screen

Show jumping simulator (Racewood, UK)
Aims of the study

- Analyse the physical effort of riders on a jumping simulator vs jumping a course of obstacles on a horse
- Analyse the stress response of riders on a jumping simulator vs jumping with a horse

Hypothesis

A jumping simulator elicits a near identical physical effort in riders but a lower stress response than jumping a horse
Material and methods

Riders
12 trainees of the Brandenburg State Stud
(6 female, 21.5±1.4 yrs old, 6 male, 19.8±2.2 yrs old)

Horses
6 geldings of the Brandenburg State Stud Riding School

Simulator
Racewood Show Jumping
Material and methods

Tasks on the horse (Brandenburg State Stud)
Warm up phase (5 min walk, 3 min trot, 3 min canter)
2 test jumps
Jumping course with 8 obstacles (90 cm height)

Tasks on the simulator (EQUITANA Equestrian Fair)
Warm up phase
One test jump
Jumping course with 13 obstacles

Parameters determined ➢ Heart rate
➢ Heart rate variability
➢ Cortisol in saliva
Heart rate variability (HRV)

= Short-term changes in heart rate

- Balance between sympathetic and parasympathetic effect of the autonomous nervous system on the heart
- Parasympathicus („relaxation“) $\rightarrow$ HRV $\uparrow$
- Sympathicus activated by stressors $\rightarrow$ HRV $\downarrow$
Results – Heart rate

Heart rate in an individual rider on a horse

Mounting  Trot  Canter  Jumping

Walk
Results – Heart rate

Heart rate in riders (n=12) on a horse
Results – Heart rate

Heart rate in riders (n=12) on the simulator

<table>
<thead>
<tr>
<th>Time (min)</th>
<th>Heart rate (beats/min)</th>
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<tbody>
<tr>
<td>1</td>
<td>80</td>
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<tr>
<td>2</td>
<td>100</td>
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<tr>
<td>3</td>
<td>120</td>
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<td>4</td>
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<tr>
<td>5</td>
<td>160</td>
</tr>
<tr>
<td>6</td>
<td>180</td>
</tr>
</tbody>
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Events:
- Mounting
- Test jump
- Jumping
Results – Heart rate

Heart rate in riders (n=12) jumping with a horse and on a riding simulator

-30 -15 jumping +15 +30

Time (min)

Horse Simulator

groups p<0.001
over time p<0.001
group x time p<0.001
Results – Heart rate variability

Heart rate variability (SDRR) in riders (n=12) jumping with a horse and on a riding simulator
Heart rate variability (RMSSD) in riders (n=12) jumping with a horse and on a riding simulator.
Results – Cortisol

Cortisol in saliva of riders (n=12) jumping with a horse and on a riding simulator

-60 -45 -30 -15 0 15 30 45 60

Salivary cortisol (ng/ml)

Time (min)

Horse

Simulator

jumping

groups p<0.01
over time p<0.01

group x time n.s.
Summary and conclusions

- Despite a „longer“ jumping course on the simulator, the heart rate of riders was higher when riding a horse.
  - *Simulator may allow to train movement patterns on a horse but physical demands are higher on horses vs. simulators.*

- Lower HRV of riders on horses vs. simulators.
  - *Situation on the horse is more complex and associated with higher sympathetic activity of the rider.*

- Higher cortisol release on the day of simulator training due to the specific test situation for the riders.
Thank you for your attention