Epidemiology of joint injuries in Thoroughbred racehorses in training - preliminary findings

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Introduction

- Joint injuries are a major cause of lost training days and economic loss to the Thoroughbred racing industry. Joint disease comprises a broad spectrum of clinical signs, including effusion, synovitis, capsulitis, sclerosis, fractures and osteoarthritis.
- Previous epidemiological studies have successfully identified modifiable risk factors for fracture and tendon injury in racehorses, primarily related to horses' exercise regimens. However, **no large-scale epidemiological studies have accurately quantified joint injury incidence in racehorses in training, or identified risk factors for such injuries**.
- Clinical and radiographic signs of joint disease often only become apparent when pathological changes are advanced. Serum biomarkers that reflect cartilage synthesis and degradation could aid in earlier diagnosis of joint damage and may be useful for monitoring disease progression or resolution. Enhanced diagnosis and disease monitoring tools could inform management strategies to minimise further tissue damage.

Aims

- **To estimate the incidence of exercise-induced carpal, metacarpophalangeal (MCP) and metatarsophalangeal (MTP) injuries in young Thoroughbreds in race training.**
- **To identify risk factors for such injuries, particularly relating to training regimens.**
- **To determine the association between serum concentrations of cartilage biomarkers and early joint damage and disease progression.**

Materials and Methods

- A cohort of Thoroughbred yearlings entering flat race training are being monitored for 2 years (Autumn 2006 until Autumn 2008).
- Horse information and daily exercise data are collected from trainers, including type of exercise, distance covered and training surface used.
- Clinical details of joint injuries are obtained from trainers and their veterinarians, who are asked to complete standard case report forms.
- **Case definition:** any horse with an injury to the antebrachiocarpal, mid-carpal, carpometacarpal, metacarpo- or metatarsophalangeal joint(s) that interferes with the planned training programme.
- Blood samples of selected case and matched control horses are collected soon after injury and monthly thereafter.
- Serum levels of chondroitin sulfate 846 epitope (CS-846 – aggrecan synthesis), the carboxy-terminal propeptide of type II collagen (CPII – type II collagen synthesis), type II collagen cleavage (C2C) and CTX II (type II collagen degradation) are measured using validated ELISA assays. Aggrecan and type II collagen are the main components of cartilage.

Results

- Between October 2006 and January 2008, **445 horses** from **13 trainers** contributed around **4624 horse months** of data.
- **129 carpal and MCP/MTP injuries** were reported in 107 horses.
- **Joint injury incidence risk = 29%** (95% CI = 25% - 33%).
- **Joint injury incidence rate = 2.8 per 100 horse months** (95% CI = 25% - 33%) (Figure 1).
- Approximately equal numbers of carpal (n=63) and MCP/MTP (n=66) injuries were reported, although this varied between trainers (Figure 1).
- Preliminary analyses of serum samples from 19 case-control sets showed that **cases had significantly higher concentrations of CS846 (P=0.02) and a higher CS846/C2C ratio (P=0.03) than controls** in the period following injury (Figure 2), possibly reflecting attempted repair processes.

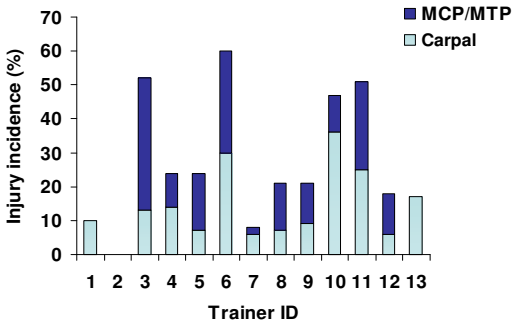

Figure 1: Incidence of carpal and metacarpophalangeal/metatarsophalangeal (MCP/MTP) joint injuries in young Thoroughbreds in flat race training, by trainer (October 2006 – January 2008).

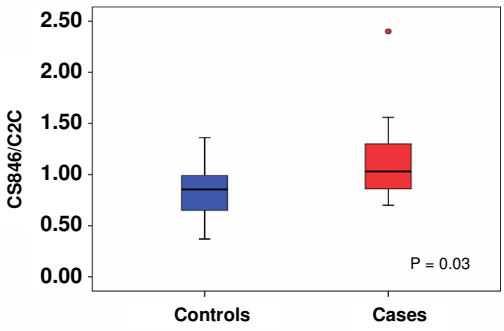

Figure 2: Mean ratio of chrondroitin sulfate 846 epitope: type II collagen cleavage (CS846/C2C) biomarker concentrations in cases of joint injury and controls, ca. 4 weeks after injury.

Conclusions

- **Carpal and MCP/MTP injuries are a common cause of morbidity in young racehorses. Identification of modifiable risk factors for these injuries may help to reduce their incidence.**
- **Specific serum cartilage biomarkers may provide a useful tool for the diagnosis and monitoring of equine joint injuries.**

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