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Musculoskeletal injuries in Thoroughbred racehorses: A study of three large training yards in Newmarket, UK (2005–2007)

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ABSTRACT

Musculoskeletal injury is the most common cause of lost training days in the young Thoroughbred horse in flat race training. To date, there has been little investigation of the regional patterns of injury frequently observed by clinicians in racehorse practice. The present study was conducted to determine incidence of musculoskeletal injuries in Thoroughbreds in training in Newmarket, United Kingdom. Veterinary records for all horses resident in three large (>100 horse) training yards were assessed for occurrence of significant musculoskeletal injury.

A total of 248 injuries were recorded in 217 individual horses, from a total population of 616 individual horses; fractures of the tibia (20.7%) and proximal phalanx (14.5%) were the most common. Overall injury rates were similar between yards (23–26%/year), with seasonal patterns noted for some injury types. Incidence of certain injuries (P1, metacarpal/metatarsal condylar, pelvic fractures, and superficial digital flexor tendonitis) varied between yards. The majority of carpal, P1 fracture and SDF tendonitis cases were right-sided.

Introduction

Epidemiological studies of exercise-related musculoskeletal injuries in Thoroughbred racehorses have been undertaken in several racing jurisdictions (Peloso et al., 1994; Verheyen and Wood, 2004; Parkin et al., 2004; Perkins et al., 2005a; Oikawa and Kusunose, 2005; Cogger et al., 2006; Boden et al., 2006; Wilsher et al., 2006; Dyson et al., 2008). The majority have investigated injuries sustained during racing (Parkin, 2008), although it is known that this accounts for only a small proportion of total injuries in Thoroughbreds in flat race training (Pickersgill et al., 2000; Verheyen and Wood, 2004).

It is generally acknowledged that variation in injury patterns exists between training centres and even individual trainers (Bathe, 1994; Verheyen and Wood, 2004; Dyson et al., 2008; Cogger et al., 2008) although specific risk factors that might account for this variation have received little attention to date (Pickersgill et al., 2000; Verheyen et al., 2006a,b). In order to further characterise regional patterns of exercise-related musculoskeletal injuries seen in Thoroughbred racehorse practice, an investigation of three training yards in Newmarket, UK was undertaken.

Materials and methods

Yard selection

Three flat racing yards were chosen for the study on the basis of similarity in population of horses in training, approach to veterinary intervention and availability of comprehensive records. Each yard was attended by one of three experienced veterinary surgeons, with some crossover attendance by these individuals as primary treating clinicians during the course of the study period. An intensive level of veterinary care was a feature of the management of each yard, with once or twice-daily routine visits by clinicians throughout the study period.

Data collection

A retrospective analysis of individual veterinary records for all horses in flat training in the three yards during the period from 1st January 2005 to 31st December 2007 was undertaken. Records were accessed through a computerised database (Rossdale and Partners' Eclipse Practice Management System v2.3, Systems Support). Veterinary reports, diagnostic images (radiography, ultrasonography, scintigraphy, magnetic resonance imaging) and surgical notes for every recorded episode of lameness were examined. Data were collated on the following injury types: (1) stress fractures (tibia/pelvis/radius/humerus/metacarpus/metatarsus/vertebral column); (2) fractures involving the metacarpophalangeal/metatarsophalangeal joints, carpus, tarsus and proximal sesamoid bones; (3) suspensory branch desmitis, and (4) superficial digital flexor (SDFT) tendonitis. Carpal fractures included displaced or non-displaced osteochondral chip and slab fractures causing acute lameness.

To be included as a case, all episodes of eligible injury had to result in clinical signs necessitating veterinary attention, and diagnosis of injury had to be confirmed using one or more of the specified imaging modalities. Injuries incurred during both training and racing were included for analysis. Injuries diagnosed upon a horse's arrival from another training yard were excluded, as were injuries sustained by horses being trained/raced temporarily outside Newmarket for international race

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meetings. Multiple injuries in the same horse at different times through the study period were included. Re-injuries at the same site were not included as separate events when considering incidence of injury types. Data analysed included type of injury, date of initial examination, age, sex and limb.

Injury categories typically associated with variable clinical signs (such that trainer or veterinary tolerance might differ substantially between yards) were not included for analysis. These included osteochondral chip fractures of the metacarpophalangeal/metatarsophalangeal joints, dorsal metacarpal disease, metacarpal/metatarsal condylar 'stress reactions' (Shepherd and Pilsworth, 1997), primary articular synovitis, 'juvenile' superficial digital flexor tendonitis (Reimer, 2002) and proximal metacarpal lameness (Powell et al., 2008). Injuries resulting from trauma, such as kicks or interference wounds, were also excluded.

Results

Average number of horses in training per year over the period of study was 106 for Yard 1, 106 for Yard 2 and 120 for Yard 3, as determined from information published in two annual lists of horses in training (*Raceform*; *Thoroughbred Printing and Publishing*). Yards 1 and 3 each had a greater proportion of 2 year-olds than 3 and 3+ year-olds, respectively. Yard 2 had an equal proportion of 2- and 3 year-olds. Ratio of male:female horses was 1.63 for Yard 1, 1.24 for Yard 2 and 1.02 for Yard 3. Over the study period the percentage of wins to runners for Yard 1 was 19.6%, Yard 2 15.3% and Yard 3 13.3% (*Racing Post Online*).

A total of 248 injuries sustained in 217 horses met the inclusion criteria; 241 of these episodes were individual injury events (seven were re-injuries). Tibial stress fractures were found to be the most common injury (50/241, 20.7%), followed by fractures of the proximal phalanx (P1) (35/241, 14.5%), carpal fractures (27/241, 11.2%), pelvic stress fractures (26/241, 10.8%) and SDF tendonitis (26/241, 10.8%), and metacarpal/metatarsal condylar fractures (25/241, 10.4%) (Table 1). The hock fractures documented were predominantly (7/9) slab fractures of the third tarsal bone, with 2/9 being central tarsal bone fractures. The majority of stress fractures categorised as 'Other' in this study involved the humerus (5/10), with the remainder being injuries of the vertebral column, femur and unspecified stress fractures. Seven horses sustained catastrophic fractures necessitating euthanasia: these involved the proximal phalanx or distal metacarpus/metatarsus (4), pelvis (1), tibia (1) and humerus (1).

The majority (43/50, 86.0%) of tibial injuries occurred at the distocaudal predilection site. The majority of P1 (24/35, 68.6%) and condylar (14/25, 56.0%) fractures, and suspensory branch lesions (16/21, 76.2%) were detected in the forelimb. For some injury types a right-sided predilection was observed: P1 (24/35, 68.6%) and carpal (22/27, 81.5%) fractures and SDFT injuries (18/26, 69.2%) occurred predominantly in the right forelimb. While SDFT (24/26, 92.3%) and condylar (18/25, 72%) injuries occurred mostly in males, sex distribution of all other injury types approximated that of the study population.

Twenty-two horses sustained more than one injury type during the study period (contributing 46 injury events). A further seven horses were diagnosed with re-injuries (same limb and site): these comprised short incomplete P1 (2) and carpal (2) fractures, SDF tendonitis (2) and tibial (1) fractures. All of these cases sustained re-injuries in the season following original injury, aside from the single case of tibial stress fracture which re-injured 5 months following original diagnosis.

The number of injuries in all three training yards was greatest between the months of March and September, a period closely corresponding to the UK flat racing season. The month with the greatest number of injuries was July. Some injury types (SDFT tendonitis, suspensory branch desmitis, condylar fractures) had a year-round incidence (Fig. 1) with inconsequential seasonal peaks while others (tibial and P1 fractures) had apparent seasonal distribution (Figs. 2 and 3). Average annual injury rates were similar between the three training yards investigated (Yard 1: 23%, Yard 2: 25%, Yard 3: 26%), however incidence of certain injury types was seen to vary considerably between yards (Table 1). P1 fractures were up to three times more prevalent in Yard 2 than the other yards. Yard 2 also contributed fewer cases of SDFT tendonitis and pelvic stress fracture than the other yards. Yard 1 had the lowest incidence of tibial stress fractures, and also a lower incidence of injury in its 2 year-old population relative to Yard 3. The P1 fractures in Yards 2 and 3 were most frequently sustained in the forelimb, while in Yard 1 hindlimb P1 fractures were most common.

Discussion

To date, many of the studies of incidence of orthopaedic injuries incurred by Thoroughbred racehorses have been concerned with those sustained on the racetrack (Peloso et al., 1994; Estberg et al., 1996; Hernandez et al., 2001; Parkin et al., 2004; Oikawa and Kusunose, 2005; Boden et al., 2006, 2007). Studies of wastage in the Thoroughbred industry as a whole have been undertaken, although these have generally included data from more than one training centre and have not primarily investigated regional or training yard variations in patterns and incidence of musculoskeletal injury (Verheyen and Wood, 2004; Perkins et al., 2005a,b; Verheyen et al., 2006a; Dyson et al., 2008).

It is recognised that the incidence of certain orthopaedic injuries can differ between training centres (Bathe, 1994; Kasashima et al., 2004; Perkins et al., 2005a,b). Factors such as training regimen, training track characteristics (configuration, surface material, gradient, maintenance) and horse type are considered to account for a large part of this variation (Cogger et al., 2006). Additionally, there is support in the literature that patterns of orthopaedic injury

Table 1
The injury categories by total number of counts (excluding re-injuries), and proportion of total injuries (overall and within each yard). Injury type/s with greatest incidence in each yard is underlined.

	n	Yards 1–3 (%) (*n* = 241)	Yard 1 (%) (*n* = 71)	Yard 2 (%) (*n* = 78)	Yard 3 (%) (*n* = 92)
Tibia	50	<u>20.7</u>	11.3	21.8	<u>27.2</u>
Proximal phalanx	35	14.5	8.5	<u>25.6</u>	9.8
Carpus	27	11.2	9.9	12.8	10.9
Pelvis	26	10.8	<u>15.5</u>	6.4	10.9
SDFT	26	10.8	<u>15.5</u>	2.6	14.1
Mc3/Mt3 (condylar)	25	10.4	<u>15.5</u>	9.0	7.6
Suspensory branch	22	9.1	8.5	9.0	9.8
Other	10	4.1	0.0	2.6	8.7
Hock	9	3.7	5.6	6.4	0.0
Mc3/Mt3 (cannon)	9	3.7	7.0	3.8	1.1
Sesamoid	2	0.8	2.8	0.0	0.0