Epidemiology of musculoskeletal injuries in two- and three-year-old Australian Thoroughbred racehorses

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I hereby certify that the thesis has not been submitted for a higher degree at any University or Institution and work embodied in this thesis is my work unless noted otherwise in the acknowledgements.

Naomi Cogger
This thesis is dedicated to the trainers and their staff. Without their commitment this research would not have been possible.
Abstract

The aim of this research was to describe the epidemiology of musculoskeletal (MS) injuries in two- and three-year-old Thoroughbred racehorses. A 27 month longitudinal study commencing in May 2000 was conducted. The study convenience sampled 14 trainers with facilities at metropolitan and provincial racetracks in New South Wales, Australia. In the 2000/01 and 2001/02 racing season, 323 and 128 two-year-olds, respectively, were enrolled in the study.

The 451 Thoroughbred horses contributed, 1,272 preparations and 78,154 training days to the study. Of the 323 horses enrolled in the 2000/01 racing season, 219 contributed three-year-old data to the study. During the study period 8%, of training days had missing training data and 3% of the 1,986 starts in the races or barrier trials were incorrectly recorded. The rate of incorrect entries varied with both study month and trainer. Similarly, the rate of training days with missing data varied between trainers and with study month.

Four hundred and twenty-eight MS injuries were recorded in association with 395 preparations in 248 two- and three-year-old Thoroughbred racehorses. The IR for all categories of MS injuries, except for tendon and ligament injuries, were higher in two-year-olds than three-year-olds, although the differences were only significant for shin soreness. Seventy-eight percent of horses enrolled in the study started, in a barrier trial or race, within one year on entering the study. After accounting for other confounders, horses that had sustained a MS injury were 0.50 times less likely to start, in a race or trial, race than those that did not sustain an injury. Seventy percent of horses returned to training after their first MS injury, and the cumulative percentage of these horses that had recovered within six months of the initial MS injury was 55%. After adjusting for clustering at the level of the trainer, the analysis showed that horses that exercised at a gallop pace ≥ 890 m/minute (but had not started in a race) prior to the onset of MS injury, were 2.14 times more likely to recover than horses whose maximum speed, prior to the onset of the first MS injury, was less than 890 m/minute. Similarly, horses that had started in a race or barrier trial were 4.01 times more likely to recover than horses whose maximum speed was less than 890 m/minute.
Training days were grouped into units referred to as preparations. A preparation began on the day that the horse was enrolled in the study, or when a horse returned to training after an absence of more than seven days from the stable. The preparation continued until the horse was lost to follow-up or left the stable for a period of more than seven consecutive days. Univariable and multivariable analytical methods were used to examine the association between a range of independent variables and four preparation-level measures of performance: (i) the duration of preparations, (ii) length of time from the beginning of the preparation until the first start in a race or barrier trial, (iii) length of time from the first start until the end of the preparation and (iv) rate of starts in races or barrier trials. After adjusting for confounders, younger horses tended to have shorter preparations, took longer to start in a race or barrier trial, had a shorter interval from the first start to the end of the preparation and fewer starts per 100 training days. MS injury was not conditionally associated with any of the outcomes considered in this chapter.

Multivariate statistical models were used to explore risk factors for MS injuries. The results suggest that MS injuries involving structures in the lower forelimb (carpus to fetlock inclusive) could be reduced by limiting exposure to high-speed exercise. This supports the proposition that training injuries are caused by the accumulation of micro damage. The results suggest there are a number of other factors that vary at the trainer level that may be risk factors for injuries, in particular joint injuries. These include unmeasured variables such as the rate of increase in distance galloped at high-speed, conformation of the horse, skill of the riders and farrier and veterinary involvement.
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Table of contents

Abstract ................................................................................................................................7
Acknowledgements .............................................................................................................9
List of Figures ..................................................................................................................15
List of Tables ..................................................................................................................17
List of Abbreviations ......................................................................................................23
Chapter 1: Introduction ...................................................................................................25
Chapter 2: Literature review ...........................................................................................29
  2.1 Introduction ...........................................................................................................31
  2.2 Epidemiology and MS injuries in horses ..............................................................31
  2.3 Defining MS injuries .............................................................................................32
  2.4 Observational study design ...................................................................................34
    2.4.1 Case-control ...................................................................................................35
    2.4.2 Case-crossover study ......................................................................................36
    2.4.3 Cohort studies ................................................................................................37
  2.5 Measures of association ........................................................................................38
  2.6 Frequency and impact of MS injuries ...................................................................39
    2.6.1 Racing-related MS injuries ............................................................................39
    2.6.2 Training-related MS injuries ..........................................................................40
  2.7 Risk factors for MS injuries ..................................................................................42
    2.7.1 Sex ..................................................................................................................42
    2.7.2 Age .................................................................................................................43
    2.7.3 Skeletal Immaturity ........................................................................................44
    2.7.4 Bone strength .................................................................................................44
    2.7.5 Body Size and Composition ...........................................................................45
    2.7.6 Conformation ..................................................................................................46
    2.7.7 Shoeing and hoof angles ................................................................................46
    2.7.8 Previous or pre-existing injury .......................................................................47
    2.7.9 Fatigue ............................................................................................................48
    2.7.10 Genetics ........................................................................................................48
    2.7.11 Training-related factors ................................................................................49
Chapter 3: Design, implementation and management of an epidemiological investigation of musculoskeletal injuries in Thoroughbred racehorses

Abstract

3.1 Introduction

3.2 Materials and methods

3.2.1 Funding and scope

3.2.2 Recruitment and enrolment of trainers

3.2.3 Recruitment and enrolment of horses

3.2.4 Data collection

3.2.5 Data management and validation

3.2.6 Classification of study time

3.2.7 Statistical analysis

3.3 Results

3.4 Discussion

Chapter 4: Profiling Australian two- and three-year-old Thoroughbred racehorses I: Incidence and impact of musculoskeletal injuries

Abstract

4.1 Introduction

4.2 Materials and methods

4.2.1 Study design

4.2.2 Classification of MS injuries

4.2.3 Calculation of incidence rates for MS injury

4.2.4 Statistical analysis

4.3 Results

4.4 Discussion

Chapter 5: Profiling Australian two- and three-year-old Thoroughbred racehorses II: Training preparations

Abstract
Chapter 6: Risk factors for musculoskeletal injuries involving the lower forelimb in the first training preparation with exposure to high-speed exercise

Abstract

6.1 Introduction

6.2 Materials and methods

6.2.1 Study design

6.2.2 Classification of study time

6.2.3 Calculation of exposure to high speed exercise

6.2.4 Selection of cases and controls

6.2.5 Statistical analysis

6.3 Results

6.4 Discussion

Chapter 7: Risk factors for first musculoskeletal injury in two- and three-year-old Thoroughbred racehorses

Abstract

7.1 Introduction

7.2 Materials and methods

7.2.1 Study design

7.2.2 Classification of study time

7.2.3 Calculation of exposure to training related variable

7.2.4 Statistical analysis

7.3 Results

7.4 Discussion

Chapter 8: General Discussion

8.1 Frequency and impact of MS injuries

8.2 Training preparations

8.3 Risk factors for MS injuries
List of Figures

Figure 3.1: Kaplan-Meier estimate of the proportion of 323 two-year-old Thoroughbred racehorses, enrolled in the 2000/01 racing season that had not been lost to follow-up, in the days after enrolment. Dashed lines represent 95% confidence interval..................................................................................................77

Figure 3.2: Kaplan-Meier estimate of the proportion of 128 two-year-old Thoroughbred racehorses, enrolled in the 2001/02 racing season that had not been lost to follow-up, in the days after enrolment. Dashed lines represent 95% confidence interval..................................................................................................78

Figure 3.3: Number of starts in official barrier trials and races that were incorrectly recorded, per 100 starts, by study month. Data based on 1,986 starts in races or official barrier trials of which 68 were incorrectly recorded. Error bars represent 95% confidence intervals (CI). ...............................................................................79

Figure 3.4: Incidence rate of missing data, as missing days per 100 training days, by study month. Data based on 78,155 training-days of which 6,051 had missing data. Error bars represent 95% confidence intervals...............................................80

Figure 3.5: Incidence rates for training days with missing training data (per 100 training days), and starts in races or barrier trials (per 100 starts) that were incorrectly recorded by trainer. Data based on 78,154 training-days of which 6,051 had missing data and 1,986 race or barriers trials of which 68 were incorrectly recorded. Error bars represent upper 97.5% confidence intervals (CI)...................81

Figure 4.1: Kaplan Meier survival curve for the cumulative proportion of 418 horses that had not raced in the days, following enrolment in a longitudinal study. Dashed lines represent 95% confidence intervals.........................................................107

Figure 4.2: Kaplan Meier survival curve for the cumulative proportion of 173 horses that returned to training after sustaining an initial MS injury, and had not recovered from the initial musculoskeletal (MS) injury. Dashed lines represent 95% confidence intervals. .................................................................108

Figure 5.1: Kaplan-Meier survival curve of the proportion of 1,272 preparations in two- and three-year-old Thoroughbred racehorses that have not ended. Dashed lines represent 95% confidence intervals.........................................................131
Figure 5.2: Kaplan-Meier survival curve for the proportion of 1,272 preparations, recorded in two- and three-year-old Thoroughbred racehorses that had not started in an official barrier trial or race. Dashed lines represent 95% confidence intervals. ...........................................................................................................................................................................132

Figure 5.3: Kaplan-Meier survival curve of the proportion of 589 preparations in two- and three-year-old that had not ended, after the first start in an official barrier trial or race. ...........................................................................................................................................................................133

Figure 7.1: Example of a counting process data set for horse 84 that suffered an episode of shin soreness and horse 85 that sustained a joint injury. The start and stop times for the first observation for both horses were 13 and 14, respectively, because all the training variables for days less than 14 days were coded as missing. Horse 84 was enrolled for 119 days and was spelled from day 17 to 103. The second horse was enrolled for 81 days and was spelled from day 19 to 64.........168
List of Tables

Table 2.1: Details of studies and incidence rates for all musculoskeletal injuries (MSI) and fatal MSI, per 1000 starts in flat racing. ................................................................. 39

Table 2.2: Conformation measurements obtained from 95 horses in an 81-day prospective study. ........................................................................................................ 46

Table 2.3: Year- and age-specific cut off values for the average rate of distance accumulation of racing-speed exercise in 60 days, above which the time period was classified as a hazard period. ................................................................. 50

Table 2.4: The optimal percentage (%) elevation of turns at racetracks given the radius of the racetrack and the velocity of the horse. ......................................................... 55

Table 3.1: Categories for the training activities, gaits and expected speeds used in the questionnaire in a longitudinal study investigating musculoskeletal (MS) injuries in two- and three-year-old Thoroughbred racehorses. ....................... 69

Table 3.2: Type of track, training surfaces and swimming facilities available at the tracks used by the 14 trainers enrolled in a 27-month longitudinal study beginning in May 2000. ........................................................................................................ 74

Table 3.3: Count and percentage of trainers enrolled and not enrolled or removed for failing to comply in a 27-month longitudinal study beginning in May 2000. .... 74

Table 3.4: Number and percentage of horses by follow-up status at the end of the study, and number and percentage with a musculoskeletal injury (MSI) in the last recorded preparation. Horses were classified as lost to follow-up if they were not in the stable in the last month of the study (July 2002). Data are derived from a total of 451 horses over a 27 month period beginning in May 2000. ......................... 75

Table 3.5: Number of horses contributing data and numbers of preparations and training days contributed by age class, and sex. Data are derived from a total of 451 horses over a 27 month period commencing in May 2000. Horses enrolled in 2000/01 contributed data to both the two- and three-year-old age classes. ........ 76

Table 3.6: Number of horses contributing data and numbers of preparations and training days contributed by trainer and sex, Data were from a total of 451 horses
over a 27 month period commencing in May 2000. Horses enrolled in 2000/01 contributed data to both the two- and three-year-old age classes. ......................... 76

Table 4.1: Variables considered as risk factors for the length of time from enrolment in the longitudinal study to the first start in an official barrier trial or race. ......................................................................................................................... 95

Table 4.2: Variables considered as risk factors associated with the length of time from the first musculoskeletal injury (MSI) to recovery (measured as start in an official barrier trial or race). ......................................................................................................................... 95

Table 4.3: Number of musculoskeletal injuries (MSI), number of bilateral injuries (n) and percentage (%) of all MSI that were bilateral, by anatomical location and nature of injury. Data from 428 injuries recorded in 248 two- and three-year-old Thoroughbred racehorses enrolled in a 27-month longitudinal study. ................. 98

Table 4.4: Age class specific incidence rates (IR) estimates per 1,000 training-days with 95% confidence interval (CI) for the first musculoskeletal injury (MSI) in Thoroughbred racehorses. Horses contributed training days at risk either to the day of their first MS injury or until they were lost to follow-up. Results based on 236 incident cases of MSI and 49,373 horse-training days at risk. ........................................ 99

Table 4.5: Age class specific incidence rates (IR) estimates, per 1,000 training-days, with 95% confidence interval (CI) for the second occurrence of musculoskeletal injury in Thoroughbred racehorses (MSI). Data restricted to horses resuming training after an initial MSI. Horses contributed training-days at-risk until either the day of their second MSI or until they were lost to follow-up. Results based on 110 cases of MSI in 19,166 horse-training days at risk. ................. 99

Table 4.6: Association between a number of independent variables and length of time, from enrolment in a longitudinal study, to the first start in a race or barrier trial for 451 two-year-old Thoroughbred racehorses during a 27-month period commencing in May 2000, ordered according to the level of statistical significance. .......................................................................................................................... 100

Table 4.7: Risk factors conditionally associated with the first start in a race or barrier trial, for 451 two-year-old Thoroughbred racehorses during a 27-month period commencing in May 2000. ............................................................................ 102
Table 4.8: Association between a number of independent variables and length of time to recovery (measured as start in an official barrier trial or race) after the first musculoskeletal injury (MSI) for 173 horses that returned to training during a 27-month period commencing in May 2000, ordered according to the level of statistical significance. ..........................................................................................104

Table 4.9: Risk factors conditionally associated with recovery (measured as a start in an official barrier trial or race) from the first musculoskeletal injury, for 173 horses that returned to training during a 27-month period commencing in May 2000.......................................................................................................................106

Table 5.1: Association between independent variables and the duration of preparations for 1, 272 preparations recorded in two- and three-year-old Thoroughbred racehorses during a 27-month period commencing in May 2000, ordered according to the level of statistical significance. .................................................................123

Table 5.2: Risk factors conditionally associated with the cessation of a preparation in 1, 272a preparations recorded in two- and three-year-old Thoroughbred racehorses during a 27-month period commencing in May 2000 (adjusted for potential clustering at the level of the horse). .................................................................124

Table 5.3: Association between a number of independent variables and the length of time from the commencement of a preparation to the first start in an official barrier trial or race for 1,274 preparations recorded in two- and three-year-old Thoroughbred racehorses during a 27-month period commencing in May 2000, ordered according to the level of statistical significance. .................................................................125

Table 5.4: Risk factors conditionally associated with a start in a race or barrier trial in 1, 272a preparations recorded in two- and three-year-old Thoroughbred racehorses during a 27-month period commencing in May 2000 (adjusted for potential clustering at the level of the horse). .............................................................................126

Table 5.5: Association between a number of independent variables and the length of time from the first start in a race or barrier trial to the end of the preparation, for 589 preparations recorded in two- and three-year-old Thoroughbred racehorses during a 27-month period commencing in May 2000, ordered according to the level of statistical significance. .............................................................................127
Table 5.6: Risk factors conditionally associated with cessation of preparation, after the first start in a race or barrier trial, in 589 preparations recorded in two- and three-year-old Thoroughbred racehorses during a 27-month period commencing in May 2000 (adjusted for potential clustering at the horse level) .................................. 128

Table 5.7: Association between a number of independent variables and the rate of starts, per 100 training days for 1,986 starts in races and barrier trial in 78,154 training days recorded in two- and three-year-old Thoroughbred horses during a 27-month period commencing in May 2000, ordered according to the level of statistical significance. ........................................................................................................ 129

Table 5.8: Risk factors conditionally associated with the rate of starts, per 100 horse-training days for 1,986 starts in races and barrier trial in 78,154 training days recorded in two- and three-year-old Thoroughbred horses during a 27-month longitudinal study (adjusted for potential clustering at the horse level). .............. 130

Table 6.1: Number and percentage of preparations in each category for categorical explanatory variables considered as risk factors for musculoskeletal injury (MSI) in the first preparation to included exposure to high-speed (HS) exercise. Data are derived from 347 preparations in two- and three-year-old Thoroughbred racehorses recorded during a 27-month longitudinal study ................................................................. 149

Table 6.2: Number of preparations and minimum (min), maximum (max) and percentiles for continuous variables considered as risk factors for musculoskeletal injuries (MSI) in the first preparation to include exposure to high-speed (HS) exercise. Data are derived from 347 preparations recorded in two- and three-year-old Thoroughbred racehorse during a 27-month longitudinal study ......................................................... 150

Table 6.3: Association between a number of independent variables and musculoskeletal injury (MSI) involving the lower forelimb in first training preparation where horses were exposed to high-speed (HS) exercise for 347 training preparations recorded in two- and three-year-old Thoroughbred racehorses during a 27 month longitudinal study, ordered according to level of statistical significance. ........................................................................................................ 151

Table 6.4: Risk factors conditionally associated with lower limb musculoskeletal injury (MSI) in the first preparation to include exposure to high speed (HS)
exercise for 347 training preparations in two- and three-year-old Thoroughbred racehorses recorded during a 27 month longitudinal study. .................................153

Table 7.1: Multivariable counting process form of a Cox regression model for the number of training days until the first occurrence of musculoskeletal (MS) injury with hazard ratios (HR), 95% confidence intervals (CI) for the HR and P-value.169

Table 7.2: Multivariable counting process form of a competing risk Cox regression model for the number of training days until the first occurrence of musculoskeletal (MS) injury with hazard ratios (HR), 95% confidence intervals (CI) for the HR and P-values for each event type. .................................170
List of Abbreviations

>  
Greater than

≥  
Greater than or equal to

<  
Less than

≤  
Less than or equal to

95% CI  
95% Confidence interval

HS  
High-speed

IR  
Incidence rate

IRR  
Incidence rate ratio

MS  
Musculoskeletal