Risk Factors for Thoroughbred Racehorse Fatality in Flat Starts in Victoria 1989-2004


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Abstract

A retrospective case-control study was implemented to identify risk factors for fatality of Thoroughbred racehorses in flat races on all racecourses in Victoria, Australia over a 15 year period. Fatalities comprised all deaths occurring during or immediately after racing and all euthanasias necessitated by race-induced injury within 24 hours of a race. The study involved 283 case starts and 3307 control starts. Univariable and multivariable backward stepwise logistic regression was used to identify risk factors for fatality at any one start. A single level model was used.

In the final multivariable model, horse gender, prior racing history, track rating, race length, racecourse location and racing year were associated with fatality. The results of this study will facilitate the development of effective strategies to improve the overall safety of horses and jockeys in flat racing in Victoria.

Introduction

Previous studies of risk factors for racing fatality and injury in North America and Britain have demonstrated that risk factors may differ between countries and even regions within countries and that research into risk factors should be focused at a regional level. In Australia, only two studies have examined risk factors for catastrophic musculoskeletal racing injury, one in flat races on metropolitan racecourses in Sydney (Bailey et al. 1997) and the other in flat and jump races combined on metropolitan racecourses in Melbourne (Bailey et al. 1998). Because the latter study utilised data encompassing all race types, risk factors specific to different race types could not be determined. Inherent differences between race types and differences in the populations of horses that participate in flat and jump races in Victoria (Bailey et al. 1998) make it likely that the risk factors for fatality will differ according to race type. The next logical step for research into racing fatalities in Victoria is to identify the risk factors that are specific for fatality in flat versus jump races on both city and country racecourses.

Materials and methods

Potential risk factors for fatality in flat starts in Victoria between August 1 1989 and July 31 2004 were studied using a retrospective case-control study with 283 cases and 3307 controls. The study was conducted at the start level (in which a start represented an individual horse entering the starting gate for a single race). A case start was defined as a start in which a racing fatality occurred with a horse dying at the beginning, during or immediately after a race or being euthanised within 24 hours of a race as a consequence of injury sustained in that race. Cases were identified from fatality report forms submitted by racecourse veterinarians and stewards to Racing Victoria Ltd. All reported cases in the study period were verified prior to enrolment using independent industry databases. Control starts were selected from an industry database by simple random sampling of all starts over the study period that were not case starts.
The study had statistical power of 82% to detect an association as significant at the 0.05 level if the actual odds ratio was • 1.7 and the prevalence of exposure in the control group was 0.1.

Potential risk factors were screened using univariable logistic regression. A likelihood ratio test p-value of • 0.25 was used as a criterion for entry of a variable into single level, multivariable logistic regression model building. Parameters were estimated by a backward stepwise model building process. Variables were retained in the multivariable model if p-values were < 0.05 (Hosmer and Lemeshow 2000).

The effect of potential confounders on the parameter estimates for variables in the final model was assessed by forcing each, one at a time, into the final model. Collinearity of continuous variables was assessed on the basis of a priori hypotheses and confirmed using Spearman’s rank correlation coefficients. Regression diagnostics were performed on the multivariable model (Hosmer and Lemeshow 2000).

**Results**

Fatality was associated with gender, prior racing history, racecourse location, track rating, race length and racing year. Compared with geldings, stallions had greater odds of fatality (odds ratio or OR 2.3, 95% confidence interval or CI 1.4-3.7) and mares had lower odds (OR 0.6, CI 0.5-0.9). Horses that had at least one start in the previous 31-60 days had 1.3 times (CI 1.0-1.8) the odds of fatality compared with horses that had no starts during the same period. Increasing prior (career) jump distance was associated with decreased odds of fatality (OR per extra 1000 metres 0.96, CI 0.9-1.0).

The risk of fatality was higher on city tracks than on country tracks (OR 1.6, CI 1.2-2.1) and on fast or good (firm) tracks compared with dead, slow or heavy tracks (OR 1.7, CI 1.3-2.2). Increasing race length was associated with increased odds of fatality (OR per extra 1000 metres 1.5, CI 1.1-2.0). The odds of fatality increased for each additional year of the study period (OR 1.05, CI 1.0-1.1).

**Discussion**

This study has identified specific risk factors for fatality in flat racing in Victoria. The results should be utilised to direct further research into starts, horses and races at high risk so that appropriate intervention strategies can be implemented to improve the welfare of horses racing in Victoria. In particular, further studies of track surfaces are required to identify the most protective surface and determine how best to maintain an optimum track condition. Specific risk factors for fatality on city versus country racecourses in Victoria also need to be investigated. Given that prior racing history was identified as a risk factor, racehorse training and racing schedules need to be explored in detail to identify intensity thresholds that may predispose to catastrophic injury. The discrepancy in risk amongst stallions, mares and geldings suggests that research into the potential role of gender differences in variables such as body weight, behaviour and sex hormone concentrations is needed.

**References**
