

## ORIGINAL ARTICLE

# An analysis of injuries resulting from professional horse racing in France during 1991–2001: a comparison with injuries resulting from professional horse racing in Great Britain during 1992–2001

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**Background:** It has been previously shown that professional jockeys suffer high rates of fatal and non-fatal injuries in the pursuit of their occupation. Little is known, however, about differences in injury rates between countries.

**Aim:** To determine the rate of fatal and non-fatal injuries in flat and jump jockeys in France and to compare the injury rates with those in Great Britain and Ireland

**Method:** Prospectively collected injury data on professional jockeys were used as the basis of the analysis.

**Results:** Limb fractures occur four times more often in both flat and jump racing in France than in Great Britain. Similarly dislocations are diagnosed 20 times more often in flat and three times more often in jump racing. This difference is surprising given that French jockeys have fewer falls per ride than their British counterparts in flat racing, although they do have more falls than the British in jump racing. Similarly concussion rates seem to be higher in French jockeys, although there may be a difference in the diagnostic methods used in the different countries. By contrast, soft tissue injuries account for a far smaller percentage of injuries than in Great Britain.

**Conclusion:** There are striking differences in injury rates between countries which may be explained in part by a difference in track conditions—for example, harder tracks in France—or different styles of racing—for example, larger fields of horses per race in France.

Horse racing is an immensely popular spectator sport. We have previously documented injury rates for professional jockeys in Great Britain and Ireland, which rank among the highest injury rates for any sport in the world.<sup>1</sup>

This paper is designed to provide a detailed breakdown of race riding injuries in France during the period 1991–2001 and to contrast those injury rates with the available data from professional horse racing in Great Britain and Ireland.

## BACKGROUND

Professional horse racing in France is broadly divided into flat racing ("plat") and jump racing ("obstacle"), both of which take place over a full 12 month season. In addition, the separate equestrian sport of trotting is immensely popular in France. No trotting takes place in Great Britain, and therefore trotting data have been excluded from this paper. As in Great Britain, the shortest flat race distance in France is 1 km (0.625 mile), and the longest race distance is 4.4 km (2.75 miles). For jump racing, the distances vary between 2 and 4.5 miles (3.2–7.2 km).

In France, most racing takes place on the major urban racecourses around Paris and at Deauville. On some rural racecourses, racing only takes place once a year (a festival or saint's day) or on a beach at low tide.

## Jockeys

Unlike Great Britain, where there are separate license categories for flat and jump racing, in France there is only one category of jockey licensing. In 2001, France Galop (the French racing authority) reported that there were 760 full jockeys and 113 apprentices registered.

There were a total of 178 male amateurs and 128 female amateurs (cavaliers) as well as an additional 23 cavaliers (former professional jockeys who are no longer working for a trainer but can take paid rides). Table 1 shows the equivalent registration information for Great Britain and Ireland.

Male jockeys dominate the professional sport. In France in 2001, there were 108 female amateur jockeys registered, and in England, there were four female flat jockeys, 32 female flat racing apprentices, three female jump jockeys, two female jump apprentices, and 168 female amateur jockeys registered. For the same year in Ireland, no information on sex is available. These rates of female jockeys are low compared with some studies from the United States, which show 25–30% female participation rates.<sup>2</sup>

There are a total of 245 racecourses in France, but most racing takes place on the seven urban racecourses around Paris and the two at Deauville (table 2). In addition, a comparison is presented in table 2 of the number of active trainers, owners, and horses.

**Table 1** Jockey registrations by country in 2001

Category	Great Britain	Ireland
Flat racing jockeys	107	59
Flat racing apprentices	128	85
Flat racing amateur	462	–
Jump jockeys	90	133
Jump racing apprentices	128	–
Jump racing amateur	468	–

**Table 2** Characteristics of horse racing by country in 2001

Country	No of racecourses	Total race meetings	No of horses	No of owners	No of trainers
France	245	1500	10 584	5973	459
Great Britain	59	1050	12 586	8360	525
Ireland	28	270	4776	3500	372

### Jockey training

In France, all jockeys are required to undergo three years of education (college) at one of the five racing schools recognised by France Gallop. This is equivalent to college, and jockeys are normally enrolled at the age of 15 or 16. Racing schools are located at Cabries (plat, trot + obstacle), Gouvieux (plat + obstacle), Graignes (trot), Boissy St Leger (trot), and Mont-de-Marsan (plat, trot + obstacle). This education is recognised by the Ministry of Agriculture and conducted under the supervision of the Department of Education. At the end of these three years, jockeys are apprenticed to a trainer for a further period of two years before becoming fully licensed.

### Medical care of jockeys

France Gallop closely regulates racing in France, and the medical arrangements on all racecourses must comply with a set of detailed instructions. At every race meeting, two appropriately trained doctors are required to be on duty solely to look after the needs of the jockeys. Separate medical care exists for injuries other than to jockeys. The injuries are recorded on a computerised system (via the internet) and from written reports provided by each race meeting. These are monitored by the chief medical adviser of the licensing authority (France Gallop) and on behalf of the Department of Social Security by AFASEC (Association de Formation et d'Action Sociale des Ecuries de Courses). All injuries in French racing are treated as injuries at work, and jockeys are therefore entitled to compensation from the government like any other worker. French law places a number of medical obligations on employers (la medecine de travail), and these include a requirement for all jockeys to have annual medical examinations carried out by AFASEC.

Professional jockeys in France are reimbursed by the government for illness or injury, whereas in Great Britain, jockeys are covered by an injury insurance scheme (Professional Riders Insurance Scheme) operated by the racing industry. This provides for weekly payments of up to £1100 per week for the injured jockey, up to a maximum of 78 weeks.

### Protective equipment

All jockeys are required to wear protective helmets to the European Standard EN 1384.1996, which became compulsory in France in January 2001. All jockeys are required to wear a body protector to the European Standard EN: 13158.2000 in Great Britain but this standard is not mandated in France. Jockeys have always been required to wear body protectors, but there was considerable variety in construction before the adoption of the European Standard. Most jump jockeys have worn a "European type" body protector since the mid 1990s, but flat jockeys have tended to use a much lighter version with less protection.

### METHODS

The relevant literature was searched using Medline (1966 to 2004) and SportDiscus (1975 to 2004) searches, hand searches of journals, and reference lists and discussions with experts and sporting organisations world wide. Keywords

and Mesh headings used in all searches included horse racing, equestrian injuries, jockeys, concussion, brain injury, head injury, head trauma, brain trauma, sports injuries, and brain commotion.

The injury data were provided by France Gallop (for French statistics), by the Jockey Club (for Great Britain statistics), and the Irish Turf Club (for the Irish statistics) and are based on the medical evaluation of every fall that has occurred on a licensed racecourse during the period 1991–2001.

During 1994, a problem with the computer analysis was encountered and statistics for that year are incomplete. All data relating to French racing for 1994 have therefore been excluded from this analysis.

The injury definition used for the purpose of this study is important. In many injury epidemiology studies, sporting injuries are defined as those causing time away from work or sports participation, but some unique differences are relevant for this sport. For example, amateur riders may only have four rides in a 12 month period and the fact that there may be a three month gap between races bears no relation to the injury severity. Professional jockeys tend to return to riding relatively quickly, although in part this often depends on the availability of rides rather than the injury recovery. This is particularly true for younger or apprentice jockeys. For the purpose of this study, an injury was defined as that recorded by the written records of the medical officer. It is acknowledged that this may under-report the more minor injuries.

Data were statistically analysed using Stata 6.0.

### RESULTS

This analysis of the injury data from France involved a review of 705 877 rides, 22 022 falls, and 3249 injuries. Tables 3 and 4 show the injury epidemiology and incidence for the various forms of racing across all countries.

It can be seen from the data that the injury incidence is appreciably different between the three countries. In flat racing, jockeys from Great Britain tend to fall more often than jockeys from the other countries. However, the risk of injury per fall is reasonably constant across the various countries. In jump racing, French jockeys fall more often and sustain more injuries per fall than the other groups.

Table 5 compares the risk of falling between countries in flat (plat) racing and jump racing. It can be seen that French jockeys have the lowest rates of falling in flat racing, whereas Irish jockeys have the lowest rates for jump racing. The risk of injury per fall is remarkably uniform across countries varying between 38.7% and 41.4%.

### Common injuries

#### Soft tissue injuries

The most common injuries overall were soft tissue injuries. These injuries included muscle contusions, ligament sprains, and muscle strains (table 6).

Consistently the injury requiring the longest period off work was internal ligamentous derangement of the knee, with an average of 130 days off work. The most common serious injury experienced by jockeys was fracture, with the upper limb and clavicle accounting for the bulk (73% in flat racing and 71% in jump racing) of such injuries. This figure is

**Table 3** Injury statistics for flat and jump racing in 1991–2001

Category	Rides	Falls	% falls/rides	Total injuries
Flat racing France	481 058	1484	0.31	574
Flat racing Great Britain	356 453	1581	0.44	629
Flat racing Ireland	77 594	285	0.37	118
Jump racing France	224 819	20 538	9.1	2675
Jump racing Great Britain	257 904	17 454	6.8	3142
Jump racing Ireland	144 508	6849	4.7	883

**Table 4** Injury rates for all racing in 1991–2001

Category	Injury incidence per ride (%)	Injury incidence per fall (%)
Flat racing France	0.12	38.7
Flat racing Great Britain	0.18	39.8
Flat racing Ireland	0.15	41.4
Jump racing France	1.20	13.0
Jump racing Great Britain	1.22	18.0
Jump racing Ireland	0.61	12.9

much higher than the 41% reported in the study by Press *et al.*,<sup>3</sup> in which a similar demographic profile of jockeys was noted.

#### Fractures

A significant difference in the fracture rates between countries was also noted. French jockeys suffer fractures at four times the rate of their Great Britain colleagues (table 7). This is an area in which under-reporting is unlikely to occur given the nature of the injury and the radiological confirmation available.

#### Dislocations

This category of injury reporting is likely to have significant variation between countries and even between individual observers. This is because it includes dislocation of the acromioclavicular joint, which is a common injury in jump racing but is often ignored when reporting shoulder injuries. Nevertheless considerably higher rates are seen in France (table 8), particularly in jump racing, which may be in keeping with the high rates of fractures described above.

#### Concussion

Concussion was a relatively common injury in this survey period. Although year to year variation occurred, it can be seen that in broad terms, the concussion rate is higher for flat racing than jump racing (table 9). This in part reflects the high speed nature of that sport and the likelihood that falls tend to occur when the horses are bunched together so that jockeys may sustain impacts from other horses in addition to contact with the ground. It can also be seen from the data

that there is a distinct geographic difference in concussion incidence, with British flat jockeys and Irish jumps jockeys having the lowest concussion rate in their respective categories compared with their overseas peers.

#### Fatal injuries

In France, there were 15 deaths (four in flat racing (1975–2001) and 11 in jump racing (1980–2001)) compared with eight (three in flat racing, five in jump racing) in Great Britain during the period 1975–2000. As per previously published studies, fatality data is normally expressed per 100 million occasions (days) of participation, but on any given day a jockey may have between 1 and 14 rides, each of which exposes him/her to risk. The Jockey Club figures are therefore expressed per 100 million rides (table 10).

#### DISCUSSION

There is a paucity of published information in the literature on professional horse racing and the injury epidemiology within this sport. This is surprising given the high media and public interest in horse racing as a spectator sport. One of the difficulties is that many papers have been written on recreational and sporting equestrian participation rather than professional horse racing.<sup>4–33</sup> There has also been considerable interest in the literature on equestrian injuries in paediatric and adolescent age groups.<sup>34–45</sup>

In this study, there are some striking differences in injury rates between countries. Fractures occur four times more often in both flat and jump racing in France compared with Great Britain, and similarly dislocations are diagnosed 20 times more often in flat and three times more often in jump racing. Although there may be an element of reporting bias in dislocations, fracture rates should be a fairly robust injury measure given the nature of the diagnosis and the ease of confirmatory investigations. This difference is surprising given that French jockeys have fewer falls per ride than their

**Table 6** Soft tissue injuries (% of total injuries)

Category	France	Great Britain	Ireland
Flat racing	32.4	84.9	57.6
Jump racing	29.3	81.9	55.2

**Table 5** Fall statistics for all racing in 1991–2001

Country	Flat racing		Jump racing	
	No of rides between falls	% of rides that result in a fall	No of rides between falls	% of rides that result in a fall
France	325	0.31	10.9	9.1
Ireland	225	0.44	21.1	4.7
Great Britain	272	0.37	14.8	6.8

**Table 7** Fractures by race category

Country	Flat racing		Jump racing	
	Fracture as a % of total falls	Fractures per 100 000 rides	Fracture as a % of total falls	Fractures per 100 000 rides
France	19.6	60.5	6.60	603.2
Ireland	9.8	36.1	3.37	159.9
Great Britain	3.3	14.6	2.51	169.8

**Table 8** Dislocations by race category

Country	Flat racing		Jump racing	
	Dislocations per 100 000 rides	% of falls resulting in dislocation	Dislocations per 100 000 rides	% of falls resulting in dislocation
France	5.3	1.73	73.9	0.81
Ireland	1.47	0.40	11.7	0.25
Great Britain	0.31	0.08	20.2	0.30

**Table 9** Concussion rates by race category

Country	Flat racing		Jump racing	
	Concussion incidence per 100 000 rides	Concussion as a % of total falls	Concussion incidence per 100 000 rides	Concussion as a % of total falls
France	17.1	5.6	163.0	1.8
Ireland	26.5	7.1	99.5	2.1
Great Britain	11.6	2.8	125.6	1.8

**Table 10** Deaths in flat and jump racing (rate per 100 million rides)

Country	Flat racing			Jump racing		
	Rides	Deaths	Death rate	Rides	Deaths	Death rate
France	1 183 595	4	338.0	489 788	11	2245.9
Great Britain	953 856	3	314.5	773 511	5	646.4

British counterparts in flat racing, although they do have more falls than the British in jump racing. The difference may be explained in part by a difference in track conditions—for example, harder tracks—or different styles of racing—for example, larger fields of horses per race.

Similarly concussion rates seem higher in French jockeys and there may well be a difference in diagnostic methods used in different countries. This may be suggested by the annual concussion incidence data. In France and Ireland, the incidence of concussion per 100 falls in flat racing is threefold higher than the concussion rate in jump racing. In Great Britain, where an intensive educational campaign has been mounted over the past four years, the difference is only 1.5 times greater.

By contrast, soft tissue injuries in France account for a far smaller percentage of injuries than in Great Britain. Owing to variations in the reporting mechanisms between Great Britain and France, it is likely that these injuries are under-reported. Doctors in Great Britain are required to notify all

injuries, however trivial. This has only recently been required in French racing and is still not required in Ireland. This can be seen when one compares the number of minor soft tissue injuries recorded in table 6.

In an extensive review of injuries associated with horse riding, Bixby-Hammet *et al*<sup>56</sup> found that deaths accounted for less than 1% of all injuries, although some case series derived from neurosurgical units report high numbers of such injuries.<sup>17 46-49</sup> In this study, the French death rate, especially in jump racing, was three times that of Great Britain. Given that the incidence of horse racing deaths has been previously shown to be far in excess of that occurring in other sports, the reason for the high French rate is unclear.

The issue of protective equipment is important. As professionals in an occupation with a significant risk of injury, it is common sense for jockeys to use protective equipment to minimise both injuries and time off work. It is recommended that an approved safety helmet be worn at all times when mounted.<sup>50</sup> The coverage of the helmet is critical,

### What is already known on this topic

- Although injury rates have previously been reported for British and Irish jockeys, no data are available for professional jockeys from other countries

### What this study adds

- There are considerable differences in injury rates between jockeys from Great Britain and Ireland and those from France, who have considerably more upper limb fractures, joint dislocations, and head injuries

with some studies suggesting occipital fractures being most common<sup>46</sup> whereas another study suggested that parietal fractures were the major issue.<sup>51</sup> The European standard EN 1384.1996 is designed for competitive riding and is compulsory for professional jockeys in both countries.<sup>52</sup>

The use of body protectors, although common, is not mandated at the present time. Body protectors or safety vests protect the trunk principally against soft tissue injuries and rib fractures. It will not protect the spinal column from compressive injuries nor against a massive crushing blow against the chest. This item weighs about 1 kg, and the European Standard garments EN: 13158.2000 are compulsory in Great Britain and Ireland. The effectiveness of this item remains to be tested scientifically.

This study adds to the limited literature on the epidemiology of injury in professional horse racing and emphasises the differences in injury rates that exist between countries.

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