



REVIEW ARTICLE

SPORTS- RELATED NEUROLOGICAL INJURY AND ITS AWARENESS: A STATISTICAL REVIEW

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Abstract

Background: Sports and recreational-related injuries include injuries to the spine, peripheral nerves, and the neuromuscular system: Though it may rarely, traumatic brain injuries of more significant severity. Almost 10% of all neurological injuries are sports injuries. Many sports events and training are under specialist supervision; a medical professional is available at the site or the hospital. The majority (63%) did not receive any formal or informal training in sports neurology- a subspecialty of neurology.

Materials and Methods: Systematic search of electronic databases has been performed. Peer review research papers, talks, seminar reports, symposium talks, workshop discussions, all reported events, and only English language materials are considered.

Results: If a professional physiotherapist or doctor is present at the event site, in most cases, a neurological problem should be detected and referred immediately. However, that's not the scenario for many events. Important points related to this issue have been made with the example of five major incidences. Some primary but straightforward care steps are suggested.

Conclusion: Primary objective of this review is to provide a summary of neurological injuries during sports. 0.47% of 1000 sports injuries are deadly, and most of them are neurological. With strict implementation of modern equipment and precautions, and timely treatment, the injuries' seriousness could be minimized. Additionally, sports neurology is a new and developing subject; hence it could include the help of primary care, physician, pediatrician, physical medicine, sports medicine and surgeons, as well as athletic trainers.

MANUSCRIPT

Keywords: injuries, sports, physical medicine, patients

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1 | INTRODUCTION

We observe three primary conditions or states.

1. Safe participation in sports and athletics by patients with neurological conditions.
2. Safe way for sports person to prevent neurological injuries.
3. Prompt medical response and short and long-term medical treatment for neurological injuries.

This review includes condition three and significant events where a sports person (Player) has injured neurological severely. As the number of participants in sports increases, that leads to a proportional increment in sports injuries. However, many neurological injuries and death are not documented or recorded in the third world and developing countries. (1)

To diagnose and treat sports-related neurological injuries, one needs multidisciplinary knowledge, including neurological specialty, and same for neurological branch, sports injuries should be included in the syllabus. Most of the complaints and symptoms are orthopedic and neurological. (2) Several associations, including the National Football players association and the international cricketer Association, have demanded that physicians with special qualifications in neurology be present at every game.

2 | DISCUSSION

The American Academy of Neurology-sports Neurology section has seen a great need for this newly developing specialty. The developed countries can provide these sorts of facilities. (3) However, developing and third world countries may not have such facilities, even are short with family physicians or sports medicine specialists. Almost 67% of Neurologists and neurosurgeons have come across sports injuries patients, and even many of them do not have special training to treat them. It increases the

demands of at least partially trained personnel to be present at the site. (4)

The second most common injury related to sports is probably a spinal cord injury. Sports activities that risk catastrophic spinal injuries are ice hockey, skiing, skating, wrestling, diving, rugby, cricket. Also, an axial compression force to the top of the head can lead to cervical fracture and quadriplegia in any sport. (5, 6)

Four sports with the highest risk of spinal cord injuries are:

1. Hockey
2. Skiing
3. Diving y
4. ugbby

Spinal cord injury has a severe long-term impact on participants' health and their families, and society.

Major neurological injuries during sports events:

1. Phillip Hughes

Phillip Joel Hughes was an Australian cricketer. He was a left-handed batsman and the youngest test centurion in both innings of a Test match.

On November 25, 2014, Hughes was hit in the neck by a bouncer during a settled Shield match at the Sydney cricket ground. He was wearing a helmet. However, the ball struck an unprotected area and collapsed before receding primary treatments. He was subsequently taken to hospital, where he underwent surgery and was placed into an induced coma. It was blunt force causing a vertebral artery dissection which led to subarachnoid hemorrhage. On November 27, 2014, Hughes died from this cerebrovascular injury. (7)

2. Patrick Day

Supplementary information The online version of this article (XXXXXXXX) contains supplementary material, which is available to authorized users.

XXXX XXXX

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As for as neurological injury is concerned, boxing is a dangerous sport.

Between 1890 to 2019 (Post COVID-19 Era), 1876 boxers died due to injuries. Patrick Day was an American professional boxer. On October 12, USBA super welter Wight title, he suffered a traumatic brain injury. The opponent was Charles Conwell. He was knocked down by Conwell three times in his fight. The final knockdown of that fight was stopped because Day's head was brutally injured by violently bounced on canvass. He was rushed to hospital, where he suffered seizures and fell into COMA. (8) Doctors performed emergency surgery. However, four days later, he died from a traumatic brain injury. According to CNN reports, "13 boxers on average die in the ring Each year."

3.Christian Sebastian de Lima Junior

Football players don't only head the ball, but their heads collide with each other or with a rod. Christian Sebastian de Lima Jr. was a Brazilian footballer who played as a forward. He was playing against Mohun Bagan (Indian football club); while scoring his second goal after chasing the ball into the box, he collided with goalkeeper-Subrata Pal. Attempts to revive him were unsuccessful, and he was declared dead at the hospital. (9)

4.Ralph Dale Earnhardt Sr

He was an American professional stock car driver and a team owner in NASCAR with experience of four decades and a total of 76 Winston cup races, and a winner of seven Winston cup championships. He was an aggressive driver and had nicknames: "The intimidator", "The Man in Black" and "Iron head." Earnhardt died in a sudden Laplace crash during the Daytona 500 due to a basilar skull fracture. That incident questioned the safety of the driver in NASCAR.

5.Joel Dark

A teenage rugby league player from Australia was collapsed following a head injury at a club in New castle, north of Sydney. He was a cousin of an international rugby player Boyd Cordner. After a severe head injury, he was admitted to John hunter hospital, where he underwent surgery. However, five days later, he died. (10, 11)

Essential information for the non-medical professional present at sports event site:

1. The human brain is the most sensitive and delicate part of the body. If a person feels uncomfortable with it, please take immediate action.
2. If a person is unconscious after the head injury, most probably, a person would back to normal. If not, call the hospital emergency department. Even if a person comes back to normal, that does not imply normal and might be a lucid interval. Nevertheless, contacting the emergency department is necessary after such events.
3. Vomiting after a head injury, or bleeding from nose, mouth or ear, or cerebrospinal fluid (CSF) leak from nose, mouth or ear, please take immediate action.
4. Most dangerously, please take the patient to the emergency department without wasting time if one is seizing after head trauma. (12)

Points to be noted:

1. A study report shows more than 40% of retired national football league players had a brain injury.
2. According to the center for disease control, 1.7 to 3.8 million traumatic brain injuries are reported each year in the USA, out of which 10% arise due to sports activities.
3. Standardized Assessment of Concussion (SAC) includes exercises as an essential tool because we may not have all types of equipment at the site.
- 4.Boxing is the first, and football is the second, are of particular neurological interest
- 5.Sports concussions affect men and women differently Female sports participants need more attention

Important Observations:

1. There are contradictory results about the effect of resistance training with BFR on Muscle damage.
2. Sports-related concussion results in a range of clinical symptoms that may or may not involve loss of consciousness.
3. Sport-related concussions may be due to direct blows to the head, face, neck, or other parts of the body transmitted to the head.

4. Most of the professional boxers have some brain damage

5. Chronic traumatic brain injury (CTBI) associated with boxing occurs in 20% of professional boxers

6. Different countries have different grading systems for the severity of brain injuries during sports events.

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TABLE 1: Actions depending on symptoms.

Sr. No.	Symp- toms	Mild	Moderate	Severe	Action
1	Pain	Heavy head	Recurring headache	Constant	In server cases contact hospital
2	Motor Dysfunc- tion	Coordina- tion problem	Disturbance with balance	Inability to control motor function	Moderate or severe cases contact super specialist.
3	Sensory function	Dizziness	Hyper- sensitivity to light or sound	Change in vision to hear to taste	In server cases contact hospital immediately
4	Speech	Difficulty in finding word	Difficulty in expressing word	Slurred speech	In serve cases contact physician
5	Cognitive	Agitation confusion	Disorient action	Difficulty in following direction or information	In or severe cases contact hospital immediately

History of sports injury and medical understanding

1920 Markland punch Drunk syndrome	1920s	Chronic traumatic encephalopathy (CTE)
Bowman and Blau first time Find persistent symptoms of retired boxers	1930s	Millsbaugh atypical symptoms of retired boxers
	1940s	
	1950s	Brand and Hallervorden AD pathology
Roberts reports on nervous system lessons	1960s	
First link defections of mitochondrial DNA to a specific clinical syndrome affecting the brain	1970s	Movement disorders and mechanism
	1980s	
	1990s	Geddes et al found neocortical NFT'S around the blood vessels in young cohort with multiple mTBI
Mackee et al further characterize CTE pathological finding	2000s	Correlation between concussion history MCI and depression Incorporation of advanced neuroimaging fluid biomarkers (eg. plasma, serum and CSF tau)
Criteria for pathological diagnosis	2010s	
Criteria of pathological diagnosis of CTE	2021	Virtual and Augmented Reality in Neurosurgery Microsurgical techniques
Introduction of sophisticated radio-on ecological		
Image guided surgery		3D and HD imaging technique

FIGURE 1: History of Sports Injury and Medical Understanding

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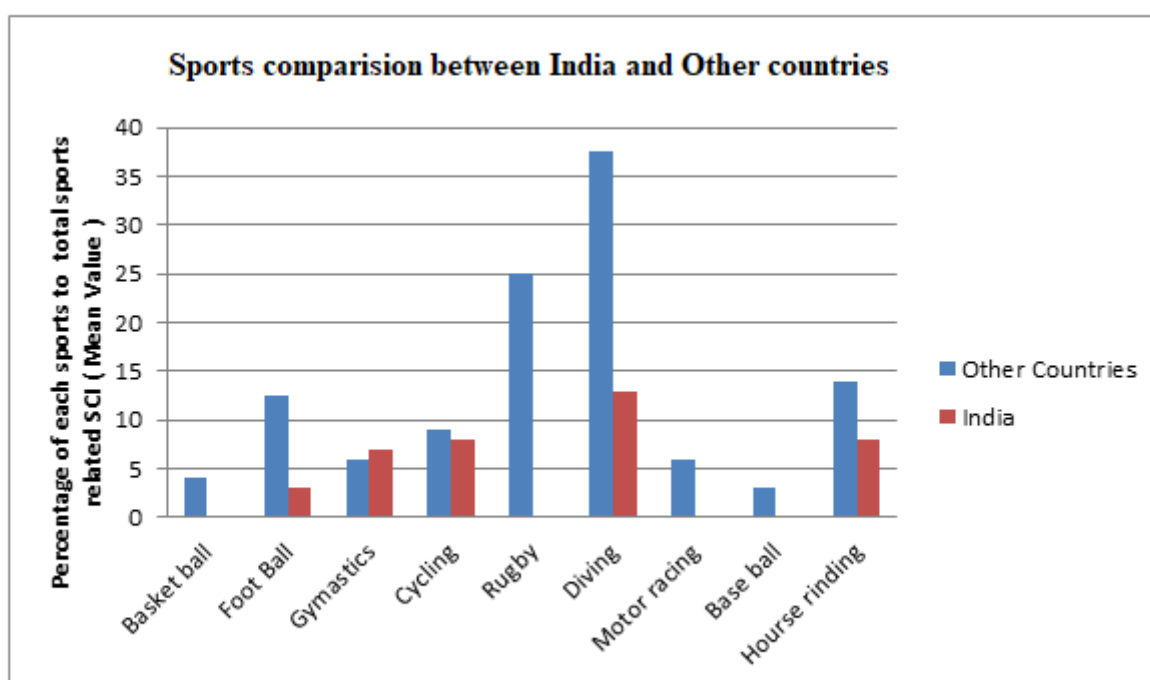


FIGURE 2: Sports Comparison between India and Other countries.

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