Soccer and head injuries

What is the risk?

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In their article "Symptoms from repeated intentional and unintentional head impact in soccer players," Stewart et al.[1] explore the link between heading the soccer ball and the development of neurologic symptoms. In contact sports, most notably football,[2] there is a link between so-called subconcussive hits and the development of long-term neurologic symptoms. The authors, in previous work,[3] saw a similar link between heading the ball in soccer and poorer scores on a memory function test.

Here, they focus on the development of neurologic symptoms (pain, dizziness, feeling dazed, or loss of consciousness) in the setting of both intentional heading of the soccer ball and unintentional head impacts (i.e., player to player, player to goalpost, or player to ground). This is important because mild neurologic symptoms, especially headache, may be the only sign of a concussion, and without an obvious injury (loss of consciousness, looking dazed/dizzy, needing medical assistance) can easily lead to underreporting of possible concussions.

HOW WAS THE STUDY DONE? Dr. Stewart et al. continued their previous research in soccer and head injury first by developing a questionnaire to better track the number of headers in practices and games. This self-report questionnaire, HeadCount,[4] was a valid estimate when compared to those counted by sideline staff. Amateur adult soccer players were recruited to fill out the questionnaire every 2 weeks. The survey questions covered the number of headers or unintentional head impacts and neurologic symptoms over the same 2-week period. Players were included if they were between 18 and 55 years old, had played at least 5 years of amateur soccer, were currently active, and played at least 6 months out of the year.

A total of 535 people accessed the study website and 240 completed the first 2-week questionnaire. From this group, 222 reported soccer activity, and combined completed 524 total questionnaires. Based on the total number of headers (intentional head impacts) reported every 2 weeks, the participants were split into 4 groups, called quartiles. The 1st quartile had an average of 3.5 headers in 2 weeks. There were 11.7 in the 2nd quartile, 28.7 in the 3rd quartile, and 124.9 in the 4th quartile. In short, those in the 3rd and 4th quartiles had many more head impacts than in the first 2 groups. The authors also looked at unintentional head impacts, and broke the participants into groups with 0, 1, or more than 2. The authors then looked to see if there was a difference between these groups. They looked at neurologic symptoms in the athletes who had unintentional head impacts. They also evaluated the risk of developing neurologic symptoms in athletes who had both heading and unintentional head impacts.

WHAT DID THE STUDY SHOW? Stewart et al. found that participants in the 3rd and 4th quartile of heading were statistically more likely to develop neurologic symptoms compared to those in the 1st quartile; that any unintentional head impact increased the risk of developing neurologic symptoms compared to participants with no unintentional head impacts. When combined, the 4th quartile of heading and any unintentional head impact were both associated with an increased risk of developing neurologic symptoms. These conclusions would fit with the common sense notion that the more times someone hits his or her head, the more likely he or she is to experience at least a moderate degree of head pain.

The study additionally looked to see if neck size had any effect on the occurrence of neurologic symptoms, as it had previously been posited that greater neck mass could be a protective factor in deterring concussion symptoms. In this study, neck size had no effect.

There were several limitations to this study. The results of the study cannot be generalized to all levels of soccer or all ages, and many who play the sport do not do so for 6 months a year. Self-report questionnaires in general are subject to errors in recall; the authors mitigated this error by using a previously validated questionnaire that allowed for a reasonable estimation of head impacts. Finally, neurologic symptoms are difficult to quantify, as moderate pain for one person may be mild for someone else (and vice versa).

WHAT DOES THIS MEAN? Concussion has become an increasingly important topic over the last several years because it has been shown that head injury can have serious long-term consequences on cognition and health. This study showed that amateur soccer players may be underreporting concussions. In

addition, it shows that these concussions may be caused by heading the soccer ball rather than only from unintentional head impacts. The study also found that so-called subconcussive blows to the head may cause concussion symptoms. These results could have similar implications for other sports where many head impacts occur outside of a traditional concussion, such as slaps to the helmet in football or body checks in hockey. A single blow of this type may not cause a concussion, but many of these could lead to concussion symptoms. Coaches may need to consider this when deciding if a player should be withheld from practice or games.

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About concussion

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WHAT IS CONCUSSION? Concussion is a type of mild brain injury. It is usually caused by hitting or jolting the head. The American Academy of Neurology defines concussion as "trauma-induced alteration in mental status that may or may not involve loss of consciousness." In other words, a person who has a concussion does not need to pass out as a result of the injury. In fact, many people who have had a concussion never lost consciousness.

Almost any sport can cause a head injury and therefore a concussion. American football and ice hockey players have the most concussions. However, concussions also occur in European football (soccer), wrestling, basketball, baseball, and softball. Mostly, concussions occur during games. Less often, head injuries and concussions occur during sports practice.

In college sports, concussion is common. McCrea et al.[5] reported the percentage of head injuries as follows: ice hockey (12.2%), football (8%), and soccer (4.8%). In high school students, McCrea et al.[5] estimated that up to 8% have had a concussion. The symptoms of concussion vary. Common complaints are vacant stare, confusion, dizziness, memory problems, poor balance, and vomiting. However, not every person who has a concussion will have all of these symptoms. For some people, the symptoms may be very mild.

There are 3 main categories of symptoms of concussion.

1. Somatic refers to bodily complaints. Headaches, tiredness, low energy, dizziness, and balance problems are a few examples of this.
2. Emotional refers to symptoms that are related to changes in mood. For instance, irritability, depression, anxiety, and personality changes can be the main symptoms of concussion.
3. Cognitive refers to the way that a person thinks. A concussion can affect thinking by changing how quickly a person responds (he or she seems slower). A person might have trouble concentrating or focusing or may become easily distracted.

In the past, doctors thought that children were less affected by head injuries than adults. However, more recent evidence suggests that the opposite may be true, and that children are more susceptible to the effects of head injuries than adults. In one study, high school football and soccer players were compared to college-level athletes.[6] The high school athletes needed more time to recover from a concussion as compared to the older athletes.

Although these studies have focused on athletes, there is another at-risk group: soldiers. It is estimated that over 300,000 soldiers in Iraq have had some type of head injury.[7] The Department of Veterans Affairs is interested in concussion. It is conducting its own studies, but it is clear that studies of head injury in athletes can be important to many other people (and vice versa).

POSTCONCUSSION SYNDROME Most athletes recover fully from a concussion in hours, days, or (at most) weeks. The time to full recovery depends on the person as well as how he or she was injured. Research has also shown that having a second concussion before recovering from the first can lead to serious problems with thinking, attention, concentration, and other brain functions. The most severe form of this is a condition called chronic traumatic encephalopathy. After many head injuries and concussions, a boxer can start to have the kinds of problems that happen when people have Alzheimer disease.

TREATMENT OF CONCUSSION The treatment needs to begin before the injury occurs. Parents and athletes need to consider how they can prevent a head injury. In some sports, like ice hockey, protective equipment is mandatory. In other sports, this type of equipment may be recommended, but not required. Prevention of the concussion is the most important aspect of treatment.

ADDITIONAL RESOURCES

Neurology Now®
journals.lww.com/neurologynow/Pages/Resource-Central.aspx
AAN Sports Concussion Resources
aan.com/concussion

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