

Special Report- from the Centre for Neuro Skills

Soccer Headgear Fails Impact Tests

Foam helmets and padded headbands do little to soften the impact of heading a soccer ball, according to a new study.

Heading has recently been associated with diminished mental capacity among professional soccer players and has spawned a new market for manufacturers of athletic equipment.

The leading brands of headgear may reduce injury from collision with a goal post or other hard object, but they fail to dampen the impact of heading a soccer ball, according to Whitaker investigator Phil Bayly, Ph.D., of Washington University in St. Louis.

Bayly and his colleagues tested four brands of headgear— Soccer Docs, Kangaroo, Head Blast and Head'r—and reported their results in the current issue of Academic Emergency Medicine.

Each head protector was placed on a metal mannequin head outfitted with pressure sensors and attached to a flexible neck. A soccer ball was propelled toward the metal forehead at 20 and 26 miles per hour to simulate heading and at 34 miles per hour to mimic a stronger collision, such as the impact from a blocked downfield kick. The researchers measured peak acceleration, which is common in impact studies, especially in auto crash testing. Only at the fastest speed did the headgear ease the impact.

The problem is that both the soccer ball and the headgear are relatively soft, so when they collide there is little change in force and acceleration.

A football helmet protects against hard objects, like the ground or another helmet, because it dissipates energy, its size reduces the velocity to the head, and its padding increases the time of impact, softening the blow.

"This decreases the stress experienced by the brain," said Bayly, who played high school soccer and coaches his 6- and 9-year-old kids.

"In my opinion, if heading is shown to be a problem, the changes should be made to the ball," Bayly said. "Lighter and softer balls will unquestionably reduce accelerations. In youth soccer, I think it's wise to avoid unnecessary heading—no need for drills in practice—but this is opinion at this point."

The American Academy of Pediatrics has recommended against intentional heading of the ball in youth soccer until more is known about the associated risks.

This area of research bears on a potentially significant health issue, since about 200 million people play soccer worldwide. Headgear has not yet become popular in the

United States, but there is some concern that the growing market for this equipment may be based on a false sense of security.

These cautionary notes come in the wake of European studies linking soccer players with mental deficiencies similar to those afflicting retired boxers.

A recent report in the Journal of Clinical and Experimental Neuropsychology concluded that both heading the ball and soccer-related concussions contribute to mental impairment.

The study conducted in the Netherlands examined 84 active professional soccer players from top clubs. The researchers looked at the relationship between the number of headers and the number of concussions and mental performance.

The number of single-season headers was linked to diminished attention and visual and verbal memory. Soccer-related concussions were associated with inability to focus attention and impaired visual and perceptual processing.

Bayly, Rosanne Naunheim, M.D., and a team of physicians and bioengineers conducted their study as part of a larger project to evaluate the risk of brain damage from repetitive blows to the head. The goal is to determine what levels of mild impact have adverse effects on the brain. The research includes studies of deformation of brain matter and neurons and the effect of these deformations on brain cells.

The current research did not examine how headbands and soft helmets affect neck rotation caused by glancing blows and other such impacts. Some aspects of headband design have been implicated in laboratory studies of neck injuries.

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