From the Field - December 2010

Posted: January 3, 2011

Injuries are a part of sports. From a little leaguer taking a bad hop off the shin to an NFL player suffering a devastating hit, it is impossible to prevent all injuries during competition – some are just inherent to the game. However, equipment innovations, enhanced strength and conditioning training, and improved playing surfaces each have the potential to reduce the risk of injury. As turfgrass scientists, our primary focus is on the playing field and its influence on injury risk.

Many of us are old enough to remember the days of the abrasive, hard AstroTurf of the 1970's and 1980's. While this surface gained acclaim for its durability and subsequent use in the popular multi-use stadiums of the day, athletes began to voice concems over the surface's toll on their bodies. The players' observations were confirmed by multiple research studies that showed a higher incidence of lower extremity injuries on traditional (non-infilled) AstroTurf than on natural grass. The perception that injuries occur more often on synthetic turf has not been lost by some, even though synthetic turf has undergone significant design changes. The question remains: have these changes in design produced a safer playing surface? A number of recently released studies are beginning to answer this question.

Most of the injury risk studies that include infilled synthetic turf have been conducted in Europe and have focused on soccer injuries. These studies compared the number of injuries occurring on infilled synthetic turf to natural grass. In each of the eight currently published studies focusing on injury risk in soccer, researchers reported no statistical difference in overall injury rate between infilled synthetic turf and natural grass. These studies covered a wide demographic, with injury data gathered from female youth players to elite professional athletes.

Only two published studies compared the injuries occurring during American football games played on infilled synthetic turf to the number occurring on natural grass. One study tracked injuries on each surface over a five year period for high school players. Overall injury incidence rates between synthetic turf (1.5 injuries per game) and natural grass (1.4 injuries per game) were similar. When the results were broken down by injury type, the data revealed unique injury patterns on each surface. For example, on natural grass, there were higher incidences of ligament injuries and head and neural trauma. On infilled synthetic turf, there were greater occurrences of non-contact injuries, muscle-related trauma, and epidermal injuries.

The same group of researchers published a second study tracking the injuries college football players sustained on infilled synthetic turf (FieldTurf) versus natural grass. Twenty-four universities were included in the study. A lower overall incidence of injury was reported on infilled synthetic turf (4.6 injuries per game) than on natural grass (5.1 injuries per game). Lower incidence rates of minor, substantial, and severe injuries were reported on infilled synthetic turf compared to natural grass. There was no difference in the rates of head, knee, and shoulder injuries between the two surfaces.

So what do these studies tell us? Based on the results of the available research, the notion that athletes are at a greater risk of suffering injury when playing on synthetic turf is not valid, if they are playing on infilled synthetic turf. It is important to look at these studies collectively, as a whole, and not cherry pick the data from one part of one study. The fact of the matter is that while these studies are the best way to track injuries occurring on various surfaces, all research suffers from inherent limitations. For example, it is sometimes difficult to determine whether the surface contributed to an injury. Additionally, lumping all natural grass fields into one category is problematic, as the condition of grass fields can greatly vary. Surely, a hard, compacted field with little turf cover has a greater potential to cause an injury than a finely manicured field. This is true for infilled synthetic turf as well. The age, type, and maintenance of the surface can affect the playing quality. Nevertheless, when looked at collectively, the take away message from the available research is that the rate of injury on natural grass and infilled synthetic turf is comparable.

For more information on athletic field research including references to the studies mentioned in this article, check out our Web site: www.ssrc.psu.edu. Also, "Like" us on Facebook (Penn State's Center for Sports Surface Research) and follow us on Twitter @PSUsportsturf.

References

2010

- Aoki, H., T. Kohno, H. Fujiya, H. Kato, K. Yatabe, T. Morikawa, and J. Seki. 2010. Incidence of injury among adolescent soccer players: A comparative study of artificial and natural grass turfs. Clin. J. Sport Med. 20:1-7.
- Bjorneboe, J., R. Bahr, and T.E. Andersen. 2010. Risk of injury on third-generation artificial turf in Norwegian professional football. Br. J. Sports Med. 44:794-798.
- Ekstrand, J., M. Hagglund, and C.W. Fuller. 2010. Comparison of injuries sustained on artificial turf and grass by male and female elite football players. Scand. J. Med. Sci. Sports.
- Fuller, C.W., L. Clarke, and M.G. Molloy. 2010. Risk of injury associated with rugby union played on artificial turf. J. Sports Sci. 28:563-570.
- Meyers, M.C. 2010. Incidence, mechanisms, and severity of game-related college football injuries on FieldTurf versus natural grass: A 3-year prospective study. Am. J. Sports Med. 38:687-97.
- Soligard, T., R. Bahr, and T.E. Andersen. 2010. Injury risk on artificial turf and grass in youth tournament football. Scand. J. Med. Sci. Sports (In Press).

2007

- Fuller, C.W., R.W. Dick, J. Corlette, and R. Schmalz. 2007a. Comparison of the incidence, nature and cause of injuries sustained on grass and new generation artificial turf by male and female football players. part 1: Match injuries. Br. J. Sports Med. 41 Suppl 1: 20-16.
- Fuller, C.W., R.W. Dick, J. Corlette, and R. Schmalz. 2007b. Comparison of the incidence, nature and cause of injuries sustained on grass and new generation artificial turf by male and female football players. part 2: Training injuries. Br. J. Sports Med. 41 Suppl 1: i27-32.
- Steffen, K., T.E. Andersen, and R. Bahr. 2007. Risk of injury on artificial turf and natural grass in young female football players. Br. J. Sports Med. 41 Suppl 1:i33-7.

2006

- Ekstrand, J., T. Timpka, and M. Hagglund. 2006. Risk of injury in elite football played on artificial turf versus natural grass: A prospective two-cohort study. Br. J. Sports Med. 40:975-980.

2004

- Meyers, M.C., and B.S. Barnhill. 2004. Incidence, causes, and severity of high school football injuries on FieldTurf versus natural grass: A 5-year prospective study. Am. J. Sports Med. 32:1626-1638.