

Efficacy of the AirArmor™ Knee and Leg Protection System Worn by NCAA Football Athletes in Intercollegiate Competition and Practice

A Retrospective Study

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ABSTRACT

We evaluated the effects of the AirArmor Knee and Leg Protection System relevant to the System's ability to prevent knee injuries of National Collegiate Athletic Association (NCAA) intercollegiate football athletes who had been using the system for a number of years during practice and games. A total of fifteen NCAA universities who had been using AirArmor in their intercollegiate football programs were asked to contribute data to the study. Five of these institutions had maintained adequate records and reported their findings which are reported collectively herein without modification. The NCAA universities contacted for this study had used from one to more than a dozen pair of AirArmor from one to eight years. These universities included: East Carolina University, Florida State, Iowa State, Mississippi State, Murray State, Notre Dame, Ohio University, Oklahoma State, Texas A & M, Texas Christian, Texas Tech, University of California Los Angeles, United States Military Academy West Point, University of Washington and Vanderbilt.

Knee injuries of high school and college football players is a major concern because they affect the short term and long term physical condition of the athletes and can cut short an enjoyable and promising athletic experience or career. Knee braces have been in use for many years, but numerous athletes are reluctant to wear knee braces because of concerns that the brace will have a negative affect on their speed and agility. The AirArmor knee brace has been identified as having no affect on the speed and agility of college football players and demonstrated the least amount of migration compared to other leading brands of braces.¹ For any protective device to be effective it must stay in the desired and required position. It has been reported that knee injuries are the most common injury for high school and college

football players.^{2 3} Additionally, new studies are identifying that girls and women have a rate of knee injuries that is six times greater than boys and men in the same sports.⁴ With the dramatic increase in participation by females in sports at all levels, also comes a dramatic increase in the incidence of knee injures of these growing numbers of female athletes. Female athletes are increasing in numbers of participants at a rate four times that of males and currently represent over 49% of all NCAA athletes.⁵ The researchers were not able to find current published data on the relationship of knee braces, (either post injury functional braces or functional being used as protective devise), relative to injury reduction. The only data found was from a study conducted at the USMA in the late 1980's which indicated an overall knee injury reduction rate of only 50% for intramural football players.⁶ However, data within the published study did not identify injuries that were experienced during games versus practices, only a combined value which does not reflect the grossly different injury rates seen between game and practice data. The NCAA ISS data reports on game and practice knee injures separately. These data are conclusive and consistent, typically quantifying knee injuries experienced in games occurring at a rate almost ten times that of practices.

MATERIALS AND METHODS

As a Retrospective Study the researchers relied in part, upon records maintained by the trainers of the universities involved in the study. As many of these universities regularly participate in and contribute to the NCAA Injury Surveillance System (ISS), it was standard procedure for these trainers to maintain injury records and for those records to be consistent with the rigorous requirements of the NCAA ISS. The Control Group is the full database of participating NCAA universities participating in the ISS. This number is typically about 120 of the

617 NCAA universities with Football Programs. It is important to note that the Test Group is a subset of the Control Group. The Control Group consists of all football athletes, (from the participating NCAA ISS universities) who do not wear knee braces, players who regularly wear knee braces and also those who wear AirArmor. The research was not comparing the AirArmor Test Group against a Control group that did not wear knee bracing at all. As a data baseline, the researchers relied on the NCAA ISS data.⁷ The researchers acknowledge that the Control Group versus the Test Group data sets would have a wider differential if the Control Group consisted of athletes who did not wear knee protection at all and that the reduction in knee injury rate due to AirArmor is therefore understated. The comparative data is therefore a net change from the full data set as it is a subset of the full data.

Statistical Analysis

Excel (Microsoft, Inc. Redmond, Washington) spreadsheet templates were created and sent electronically to the head athletic trainers at each of the fifteen universities invited to participate in the study. Five of the universities had maintained sufficient records of the players using AirArmor, allowing them to report. The athletic department at all five universities filled in the data in the Excel spreadsheets provided and returned the files electronically. The data from these five sources were compiled and placed into an Excel workbook and the data were combined for a full data set. The overall time period reported spanned eight years and included more than 40,000 exposures. Game and practice exposures and related injuries, if any, were reported separately and collectively.

TABLE 1
Objective Data after Compilation of Relative Knee Injuries and Number of Exposures

<i>AirArmor NCAA Users</i>	<i>Collective Data</i>									
	1996	1997	1998	1999	2000	2001	2002	2003	Total	Median
Exposures - Practice	3,795	4,961	4,940	5,251	4,576	4,662	4,818	4,300	37,303	4,740
Exposures - Games	393	451	418	462	589	476	544	447	3,780	457
Knee Injuries - Practice	0	0	1	0	0	2	2	0	5	0
Knee Injuries – Games	0	0	0	1	0	0	0	1	2	0
Overall Knee Injuries	0	0	1	1	0	2	2	1	7	1
Total Exposures	4,188	5,412	5,358	5,713	5,165	5,138	5,362	4,747	41,083	5,262
Total Injuries	0	0	1	1	0	2	2	1	7	1
Injury Rate – Practice	-	-	0.202	-	-	0.429	0.415	-	0.134	-
Injury Rate – Games	-	-	-	2.165	-	-	-	2.237	0.529	-
Injury Rate – Overall	-	-	0.187	0.175	-	0.389	0.373	0.211	0.170	0.181

RESULTS

Of the 15 Universities invited to report exposure and injury data of NCAA intercollegiate football players wearing AirArmor, 5 provided data. The collective data are presented in Table 1 without modification. These data were compared to 2002 NCAA ISS data which confirmed knee injury rates of 0.79 and 7.98 knee injures per 1,000 exposures in practice and games respectively. NCAA ISS data for 2004 are 0.65

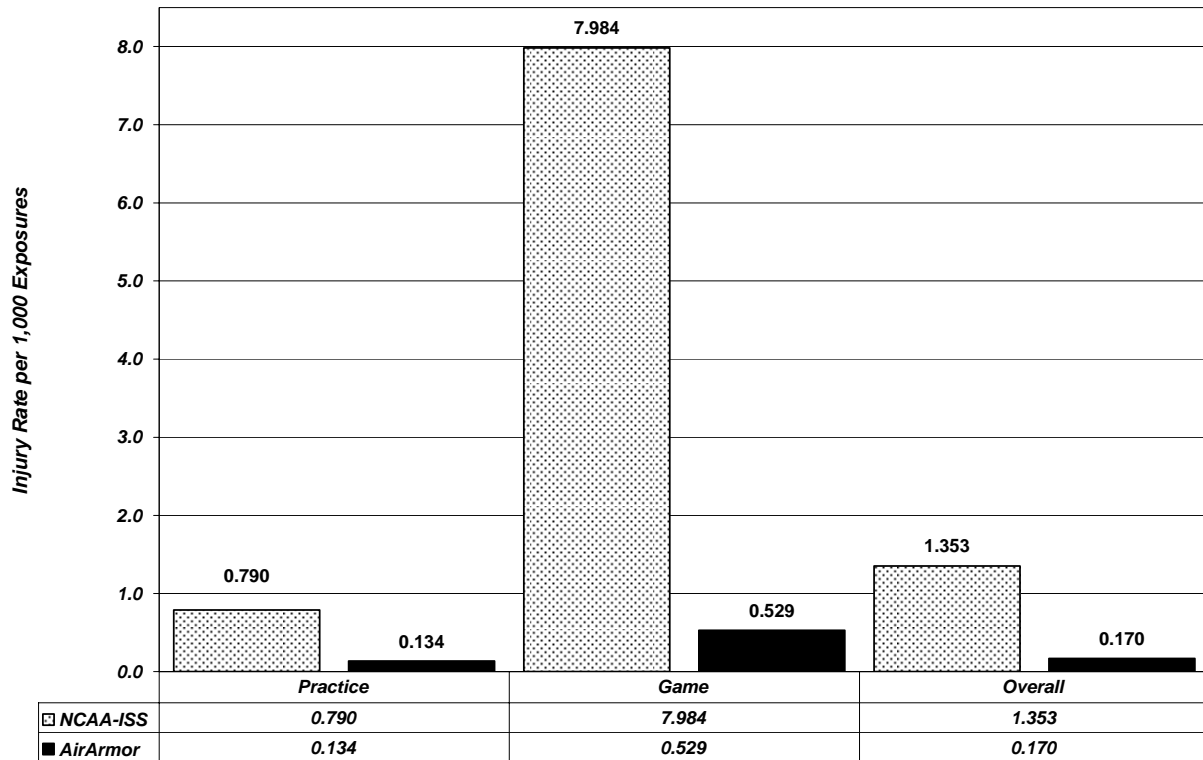
and 8.56 knee injures per 1,000 exposures for practice and games respectively. The data are conclusive that NCAA football players wearing AirArmor have an overall knee injury rate that is 93.8% less than the overall population of NCAA players, some number of those players who are wearing knee braces.

The dramatic differentials between the AirArmor subset and the overall NCAA-ISS data sets are demonstrated in Figure 1. The graph depicted in Figure 1 shows the significant difference in

injury rates resulting from games and how that data are skewed when combined with the practice knee injury rates and reported together.

FIGURE 1

Football Knee Injury Rates NCAA-ISS & AirArmor



CONCLUSION

The researchers have concluded that the AirArmor Knee and Leg Protection System provides a clearly substantial reduction to the risk of knee injuries of NCAA intercollegiate football players. This improvement is most dramatic when reviewing Game injury rates where competitive dynamics of the game increase the risk of injury. While football is a hard hitting contact sport the researchers believe athletes in other sports would also benefit from the use of AirArmor as most knee injuries in sports occur without contact with another player.⁸

² Halpern B, Thompson N, Walton WC, et al: High school football injuries: Identifying the risk factors. *American journal of sports medicine* 16: S113-S117, 1988.

³ Top Three Body Parts Injured, in *Injury Surveillance System, Football, NCAA Sports Sciences*. Overland Park, KS, National Collegiate Athletic Association, 2002-2003, p28

⁴ C. Robert Biondino, M.D. *Anterior Cruciate Ligament Injuries in Female Athletes*, Connecticut Medicine. November 1999; Vol. 63, No. 11, 657-660

⁵ Sports Participation 1982-2001, *NCAA Research*; p11-48

⁶ Sitler M, Ryan J, Hopkinson W, et al. The efficacy of a prophylactic knee brace to reduce knee injuries in football. *The American Journal of Sports Medicine*, Vol 18, No.3 p 310-315.

⁷ *Injury Surveillance System, Football, NCAA Sports Sciences*. Overland Park, KS, National Collegiate Athletic Association, 2001-2002

⁸ Your Medical Source: *What Causes an ACL Tear?* http://yourmedicalsourc.com/library/acltears/ACL_causes.html

¹ Green DL, Hamson, KR, Bay, RC and Bryce CD: Effects of Protective Knee Bracing on Speed and Agility. *The American Journal of Sports Medicine*, Vol. 28. No 4, p453-459.