Surface-Related High School Football Game Injuries on Pad and No Pad Fields (101)

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Objectives: Today's new generations of artificial turf infill systems are increasingly being installed with lighter weight infill systems, which often incorporate interlocking polypropylene or thermoelastomer pad systems under the fiber-infill layers, reportedly to reduce surface shock, decrease concussions, and enhance shoe: surface stability. At this time, however, the effects of pad systems on high school football trauma during game conditions are unknown. With more than one million athletes playing competitive football, the rise in medical costs, and the increasing popularity of base pads being installed today as an alternative to heavier infill weight systems, this study focused on quantifying the potential influence of this practice on the incidence, mechanisms, and severity of game-related, high school varsity football injuries.

Methods: Artificial turf playing fields were divided into two groups based on a pad underlayer or a no pad system. Fifty-eight high schools participated across three states over 7 seasons. Outcomes of interest included injury severity, injury category, primary type of injury, injury mechanism, anatomical location of trauma, type of tissue injured, and elective imaging/surgical procedures. Data were subject to multivariate analyses of variance (MANOVA) and Wilks' λ criteria using general linear model procedures. Data were expressed as injury incidence rates (IIR) per 10 game season.

Results: Of 658 varsity games documented, 260 games were played on fields containing pads, and 398 on no-pad fields, with 795 total injuries reported. MANOVA indicated a significant main effect across pad and no pad playing surfaces by injury severity ($F_{3,791} = 11.436$; $P < .0001$), knee trauma ($F_{9,785} = 2.435$; $P = .045$), injury category ($F_{3,791} = 3.073$; $P < .0001$), primary type of injury ($F_{10,785} = 2.660$; $P < .0001$), injury mechanism ($F_{13,781} = 2.053$; $P < .001$), anatomical location of trauma ($F_{16,778} = 1.592$; $P < .001$), type of tissue injured ($F_{4,790} = 4.485$; $P < .0001$), and elective imaging and surgical procedures ($F_{4,790} = 4.248$; $P < .002$). Post hoc analyses indicated significantly higher ($P < .05$) substantial injury [10.3, (95% CI, 10.0-10.5) vs 3.0 (2.5-3.4)], player-to turf trauma [6.5, (95% CI, 5.9-7.1) vs 2.0 (1.6-2.4)], patellofemoral syndrome [1.3, (95% CI, 0.9-1.7) vs 0.3 (0.2-0.5)], neck strain [2.0, (95% CI, 1.5-2.5) vs 0.3 (0.2-0.5)], lower leg strain [3.9, (95% CI, 3.3-4.5) vs 1.1 (0.8-1.4)], and a higher number of lower extremity elective imaging and surgical procedures requested [7.2, (95% CI, 6.7-7.7) vs 3.2 (2.8-3.7)] when competing on artificial turf fields with pads as compared to no pad systems, respectively. In regard to reducing the frequency of concussions, there was no significant difference in concussion rate attributed to turf impact [0.3, (95% CI, 0.2-0.6) vs 0.1 (0.1-0.3)] between pad and no pad fields, respectively.

Conclusions: The addition of a pad under an artificial turf surface increases injury rates when compared to non-pad fields across most injury categories. At this time, findings do not support the current trend of installing lightweight padded infill systems at the high school level of play. This is the first longitudinal study to investigate the influence of a pad on sport trauma, when integrated with an artificial turf infill system.

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