Title: The Effect of Ankle Braces on Injury Rates in High School Basketball Players

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Purpose: Determine if semi-rigid lace-up ankle braces will reduce number and severity of acute first-time and recurrent ankle injuries sustained by high school basketball players.

Methods and Study Design: Cluster randomized controlled trial. 1460 high school male and females from 46 schools were randomly-assigned to braced or control group. Braced group wore lace-up ankle braces during 2009-2010 basketball season. Athletic trainers recorded brace compliance, athletic exposures and injuries. Injury rates/1000 athletic exposures were tested between groups using chi-square test. Multivariate Cox Proportional Hazards model (adjusted for sex, grade, level of competition, BMI, and previous injury history), accounting for intra-cluster correlation, was utilized to compare time-to-first acute ankle injury between groups. Injury severity (days lost) was tested with Wilcoxon Rank Sum.

Results: The rate of acute ankle injury was 0.47 in the braced group compared to 1.41 in the control group (adjusted Cox Hazard Ratio (HR) 0.32, 95% Confidence Interval (CI) 0.20, 0.52). The median severity of acute ankle injuries was not significantly different (p = 0.23) in the braced group (6 days) compared to the control group (7 days). For players who reported a previous ankle injury, the incidence of acute ankle injury was 0.83 in the braced group compared to 1.79 in the control group (Cox HR 0.39, 95% CI 0.17, 0.89). For players who did not report a previous ankle injury, the incidence of acute ankle injury was 0.40 in the braced group compared to 1.35 in the control group (Cox HR 0.30, 95% CI 0.17, 0.53).

Conclusions: The use of a lace-up ankle brace reduced the incidence but not the severity of acute ankle injuries in male and female high school basketball athletes both with and without a previous history of an ankle injury.

Significance: Wearing lace-up ankle braces is a relatively cheap, effective injury prevention strategy.
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Abstract Title: Pitching biomechanics associated with elbow or shoulder pain in youth baseball pitchers: A prospective cohort study

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Purpose: Half of male baseball pitchers nine to 14 years of age report elbow or shoulder pain. While previous studies have demonstrated the incidence of elbow or shoulder pain increases with the number of pitches thrown, it remains unclear whether specific pitching techniques are associated with elbow or shoulder pain in youth pitchers. The purpose of this investigation was to determine the relationship between 3D biomechanical kinetic and kinematic variables of the pitching motion and the incidence of elbow or shoulder pain in youth baseball pitchers.

Methods and Study Design: Fifty six male baseball pitchers at Tanner stage 2 or 3 of pubertal maturation with no previous elbow or shoulder pain were recruited from Chicago community baseball leagues. Subjects completed questionnaires about their pitching and medical histories. Height, weight, and three dimensional kinematics and kinetics of pitching were measured for each subject. During their next two baseball seasons in 2006 and 2007, subjects reported weekly via a secure website the number of pitches they threw that week, and whether they had elbow or shoulder pain. Principal component analysis ranked the variables based on the first principal component loading. The fifteen top ranked variables were compared between subjects who developed pain and those who did not using paired t-tests. Level of significance was set at 0.05.

Results: Thirty-nine subjects completed the study. Six subjects (P) reported elbow and/or shoulder pain at least twice during the 2006 season. Twenty-four subjects (NP) reported no pain during 2006 or 2007 seasons. There were no significant differences in BMI (19.8±4.1kg/m2 vs 19.6±3.1kg/m2), number of pitches per game (43.3±9.8 vs 40.1±9.1), or number of pitches per season (894±404 vs 849±480) between P and NP. Compared to NP, P had significantly lower shoulder elevation at initiation of elbow extension in stride (34.44°±12.80° vs 51.89°±16.30°; p=0.019), lower average shoulder elevation from the start of the pitching cycle to maximum shoulder elevation (38.89°±10.04° vs 63.14°±20.74°; p=0.0007), and greater shoulder internal rotation at initiation of shoulder external rotation wind-up (13.00°±17.10° vs -16.39°±28.76°; p=0.006).

Conclusions: Using 3D motion analysis, we identified three kinematic parameters of the pitching motion that are independently significantly different between youth pitchers who develop shoulder or elbow pain and those who do not.

Significance of Findings: Understanding which parameters of the throwing motion may increase the likelihood of injury will help guide prevention efforts.
Screening for Insulin Resistance and Cardiovascular Risk in Collegiate Football Linemen

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Purpose: To investigate the relationship between fitness, obesity, and the risk factors of type 2 diabetes and cardiovascular disease in obese-classified (by BMI > 30kg/m²) collegiate football linemen and male students of similar age and BMI.

Methods and Study Design: Cross-sectional study involving 2 groups of volunteer students (30 collegiate linemen and 10 sedentary peers.) Height, weight, blood pressure, body fat percent (BF%), and fasting glucose, total cholesterol, LDL, HDL, triglycerides, and insulin were measured. The 2-sample Wilcoxon test was used to compare groups (alpha = .05). After dichotomizing into a risk indicator: 0 (cut-off), Fisher’s exact tests were used to compare the frequency of subjects at risk. Spearman rank was used to obtain correlations between BF%, BMI, and outcomes.

Results: The athlete group had lower mean (SD) BF% (21.8 [3.89] vs control (27.1 [7.07]; P = .01) despite no significant difference in age, weight, height, or BMI. The athlete group had lower systolic blood pressure (135.6 [13.29] mmhg vs 148.1 [13.77]; P = .015) and at-risk LDL (10% vs 40%; P = .05). The groups did not differ significantly in other measures, including percent glucose >100 mg/dl (athlete 16% vs control 20%), HDL 150mg/dl (40% vs 20%). Body fat percent (before and after adjusting for BMI) was significantly correlated with every risk factor except glucose, while BMI was only significantly correlated with blood pressure and insulin.

Conclusions: Despite the small sample size, results supported our hypothesis that the football group would have a healthier risk profile, particularly with respect to blood pressure and LDL. Body fat percent was more strongly correlated with risk factors than BMI.

Significance of Findings: On average, football linemen have select risk factors, importantly blood pressure, that are improved over sedentary peers, but do not have healthy enough cardiovascular and metabolic profiles to be exempt from preventative screening and long-term intervention. Body fat percent is a more accurate predictor of risk than BMI in this population.

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