Fluctuations in Blood Biomarkers of Head Trauma in NCAA Men's Soccer Athletes over the Course of a Season

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ABSTRACT

Repetitive subconcussive impacts to the head are commonplace in soccer. The ability to detect the extent of neurological injury due to these impacts over the course of a season is paramount. **PURPOSE**: The purpose of the current study was to examine alterations in blood biomarkers of head injury over the course of a soccer season. **METHODS**: Sixteen National Collegiate Athletic Association (NCAA) male soccer athletes participated in weekly blood sampling throughout an 18-week season. Athlete statistics were received from the coaches post-season. Serum samples were stored at -80°C until analysis for Tau and Neurofilament Light polypeptide (NFL) using a Quanterix™ Simoa HD-1 analyzer. We used R statistical language and the *lme4* statistical package to perform a linear mixed effects analysis of the relationships of minutes played (MP) and headers (HEAD) with Tau and NFL. We included the intercept for subjects as a random effect, and time point (TP), MP and HEAD (without the interaction term) as fixed effects. P-values for model comparisons were obtained by likelihood ratio tests. **RESULTS**: NFL was significantly elevated in weeks 5 (7.3±2.8pg/mL; p<0.001), 14 (7.0±3.1pg/mL; p=0.047), and 15 (7.9±4.0pg/mL; p<0.001) compared to baseline (5.2±1.2 pg/mL). Tau did not change significantly over the course of the season. Neither adding MP ($\chi^2(1)=1.85$, p=0.17) nor adding HEAD ($\chi^2(1)=0.15$, p=0.69) as predictors improved the model fit for Tau compared to the null model with only the control variable TP. Similarly, the addition of MP as a predictor did not improve model fit for NFL ($\chi^2(1)=1.50$, p=0.22). Conversely, including HEAD improved the model fit for NFL compared to the null model with only the control variable TP ($\chi^2(1)=5.68$, p=0.02). However, only a small negative effect of HEAD (estimate = -0.09) was detected. **CONCLUSION**: In our study, neither MP nor HEAD were significant predictors for Tau concentration over the course of an NCAA Men's soccer season. HEAD appeared to have a small predictive effect on NFL concentrations across the season. Research reported in this publication was supported (in part) by the National Institute on Aging of the National Institutes of Health under Award Numbers R01AG051848, R01AG058537, and R01AG058252. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.