Sweat Electrolytes, Intensity, And History on The Prediction of Exercise-Associated Muscle Cramps: A Multifactorial Approach

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Exercise-associated muscle cramps (EAMCs) are one of the most common conditions to occur during or after physical exercise. The pathophysiology behind these cramps has remained unclear making it difficult for sports medicine personnel to effectively prevent or treat. The fluid and electrolyte theory and the altered neuromuscular control theory are the two main theories circulating in past literature and it was not until recently that some researchers have suggested taking a multifactorial approach. **PURPOSE:** To determine if sweat sodium concentration, self-perceived intensity, and having a history of EAMCs predicted the development of EAMCs in Collegiate American football players. **METHODS:** Forty division three football players were recruited to participate in three trials during the regular football season. Sweat sodium concentration was collected via a sweat patch that was applied to the right forearm and removed after 70 minutes of practice. Sweat sodium concentration was then analyzed using the Horiba LAQUAtwin Salt-22 NaCl Compact Ion Meter (LAQUAtwin-Salt-22, Horiba Scientific). Self-perceived intensity was measured post-practice using the Borg RPE score. History of EAMCs was measured prior to trial participation using a History of EAMCs questionnaire. A post-practice questionnaire was used to determine if the participants experienced an EAMC or not after each trial. **RESULTS:** None of the predictor variables had a significant effect on the development of EAMCs for any trial ($p > .05$). Only two EAMCs were reported between the three trials with one EAMC reported after the second trial and one EAMC reported after the third trial. For trial 2, 62% of the outcome variable (EAMCs) was explained by the predictor variables (Nagelkerke $R^2 = .620$). For trial 3, 49% of the outcome variable (EAMCs) was explained by the predictor variables (Nagelkerke $R^2 = .494$). **CONCLUSION:** This study did not find that sweat sodium concentrations, self-perceived intensity level, and having a history of EAMCs were accurate predictors for the development of EAMCs. Although none of the predictor variables produced a statistical significance ($p < 0.5$), some trends were noticed. The two players that did experience an EAMC cramped during trials where their own individual sweat sodium concentration was higher compared to the other trials. Both participants that did experience an EAMC also reported a higher level RPE and had a history of EAMCs. Future research should continue to investigate a multifactorial approach to identify predictor variables between the two popular EAMCs theories. **SIGNIFICANCE/NOVELTY:** To the best of the researcher's knowledge, there has been no published study investigating a multifactorial approach to predicting exercise-associated muscle cramps. Previous research has explored possible predictors associated with the fluid and electrolyte theory and the altered neuromuscular control theory, but not combining possible predictors from both theories.