Morning vs Afternoon Differences in Hydration Status Assessments

KARISSA MESQUITA[1], JAN-JOSEPH S. ROLLOQUE[1], MARCOS S. KEEFE[1], RYAN A. DUNN[1], CASEY R. APPELL[2], NIGEL C. JIWAN[2], HUI-YING LUK[2], & YASUKI SEKIGUCHI[1]

[1]Sports Performance Laboratory, Department of Kinesiology and Sport Management, Texas Tech University, Lubbock, TX; [2]Applied Physiology Laboratory, Department of Kinesiology and Sport Management, Texas Tech University, Lubbock, TX

Category: Undergraduate

Advisor / Mentor: Sekiguchi, Yasuki (yasuki.sekiguchi@ttu.edu)

ABSTRACT

First-morning spot samples are commonly used to assess hydration status accurately. However, there is a lack of literature examining the accuracy of afternoon spot samples to assess hydration status compared to the morning samples and the relationships between variables, especially in the afternoon assessments. **PURPOSE**: To compare the accuracy of using spot samples to monitor hydration status in both morning and afternoon and to identify relationships between each hydration assessment. **METHODS**: 24 participants (12 males; age: 21±2years, mass: 81.0±15.9kg; 12 females; age: 22±3 years, mass: 68.8±15.2kg) completed this study. Hydration measurements of urinary indices (urine color [U_{COL}], urine specific gravity [USG], and urine osmolality [U_{OSM}]), perceptual thirst sensation, body mass (BM) to calculate %body mass loss (BML), and plasma osmolality (P_{OSM}) were collected at first-morning and afternoon spot samples for 6 days across a 7-day period. On days 1-3, subjects maintained a free-living status, whereas days 5-7 required a euhydrated state (USG < 1.020), with one day separating the conditions (day 4). Receiver operating characteristics analysis (i.e., sensitivity and specificity) was performed to calculate the predictive value for determining hydration status for each variable compared to P_{OSM}. Pearson's correlation coefficient analysis assessed relationships between all variables for morning and afternoon time points. **RESULTS**: From first-morning samples, U_{COL} and thirst resulted in low sensitivity (0.418, 0.490) but high specificity (0.630, 0.522), whereas USG and U_{OSM} resulted in high sensitivity (0.786, 0.755) but low specificity (0.283, 0.283). For afternoon samples, U_{COL}, USG, U_{OSM}, and thirst resulted in high sensitivity (0.697, 0.872, 0.817, 0.881) and low specificity (0.314, 0.391, 0.314, 0.171). In a first-morning sample, U_{COL}, USG, and U_{OSM} were significantly correlated with each other (U_{COL} and USG, r = 0.746, $p < 0.001$; U_{COL} and U_{OSM}, r = 0.764, $p < 0.001$; USG and U_{OSM}, r = 0.934, $p < 0.001$). However, thirst, P_{OSM}, and %BML did not demonstrate significant correlations with the other variables (*ps* > 0.05). From the afternoon timepoint, %BML demonstrated significant correlations with thirst (r = 0.326, $p < 0.001$), U_{COL} (r = 0.319, $p < 0.001$), USG (r = 0.346, $p < 0.001$), and U_{OSM} (r = 0.344, $p < 0.001$). In addition, U_{COL}, USG, and U_{OSM} were significantly correlated with each other (U_{COL} and USG, r = 0.804, $p < 0.001$; U_{COL} and U_{OSM}, r = 0.841, $p < 0.001$; USG and U_{OSM}, r = 0.951, $p < 0.001$). However, thirst and P_{OSM} were not significantly correlated with the other variables (*ps* > 0.05). **CONCLUSION**: In conclusion, hydration status assessments, such as urinary indices and thirst perception, performed during the afternoon, may accurately detect euhydration status in individuals. This observation allows individuals and practitioners who cannot obtain first-morning hydration status assessments to accurately detect hydration status in the afternoon. Additionally, %BML in the afternoon may also indicate accurate hydration status assessment.