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Independent Validation of a Commercial Saliva Osmometer for Hydration Monitoring

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BACKGROUND

Saliva osmolarity (SOsM) can be an accurate indicator of hydration status in the absence of oral contaminants and if individual differences are taken into account. At present, most laboratory osmometers determine OsM via liquid freezing point, which is not a practical approach for fieldable devices. However, in 2019 MX3 released a small commercial osmometer capable of determining SOsM via electrochemical sensor. The result is a point-of-care device comprised of a hand-held reusable reader, non-reusable (one time) sensor, and a mobile phone application. Important features of the MX3 include the requirement for only a small sample volume (less than 2 µl), a reader that works either in standalone mode or when paired with a mobile phone, and the incorporation of a euhydration protocol for individual user calibration. In a pair of internal validation studies (N=33 and N=20) strong correlations (both approx. r = .97) were reported between estimates of SOsM from the MX3 and those from a laboratory-grade osmometer (Osmette III). The purpose of this study was to INDEPENDENTLY replicate (or not) these findings with a larger sample size.

METHODS

Researchers collected 406 saliva samples from a cohort of 50 active duty Airmen who were taking part in a 12 week fitness intervention as part of an unrelated research project. Saliva samples were collected via passive drool tube (N = 203) and directly from the mouth using the MX3 sensor (N = 203) in close time succession (less than 30 seconds apart) and under different training conditions (e.g., pre and post workout) to increase the likelihood of obtaining a broad range of SOsM values.

RESULTS & CONCLUSION

Results indicated a high correlation (r = .96) between estimates of SOsM from the MX3 with those of the Osmette III when measurements were taken from the same samples of passive drool. When Osmette III measurements taken from passive drool were compared to MX3 measures obtained from the mouth, a moderate-high correlation (r ·= .77) persisted. Together, these findings indicate that the MX3 is accurate in its estimates of SOsM as compared to a laboratory grade osmometer. We are now planning follow-up studies to assess MX3s usability, the precision of its euhydration calibration protocol and its comparison to more common field measures of hydration (e.g., body weight loss and urine specific gravity).