# Ability of Salivary Osmolality to Predict Urine Osmolality and Hydration Status in Athletes

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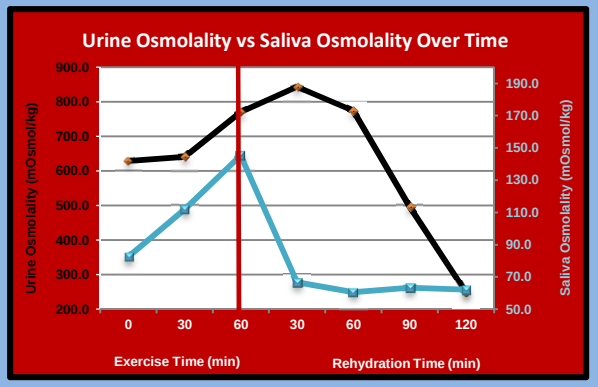
## Purpose

1. To compare the use of saliva to urine as a hydration screening tool
2. To convey the ease of collecting saliva to use as a marker for hydration status

## Background

- Walsh et al. concluded that salivary osmolality appears to correlate strongly with plasma osmolality to track hydration changes. (r=0.87)
- Walsh et al. concluded that salivary osmolality is strongly correlated with % body mass lost during dehydration. (r=0.94)
- Salivary osmolality detected changes in body mass of as little 1.1% in previous studies.
- Saliva offers advantages over urine because it is cheap, quick, and non-invasive.
- Individuals with very limited training can collect saliva and no special collection equipment is necessary.

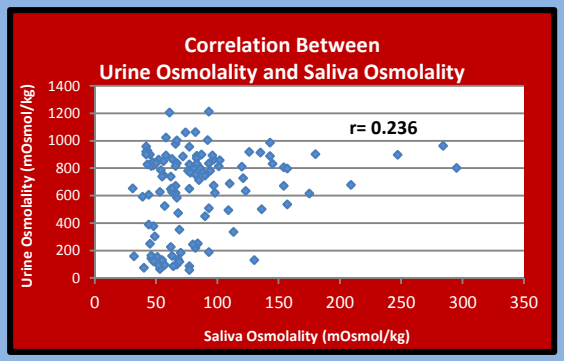



## Results

- Linear regressions performed to determine that salivary osmolality did not highly predict urine osmolality (r= 0.236).
- Saliva detected as little as 0.8% body weight lost.
- Average total percent body weight lost of 1.6% after one hour of exercise.

## Discussion

- While not as precise, salivary osmolality appeared to be more sensitive than urine osmolality to acute hydration changes, making it more valuable when needing to assess hydration status in critical situations. The saliva curve peaked earlier and dropped quicker than the urine curve.
- Subjects were not consistently hydrated as instructed at the start of testing.
- Initial voids per subject were not consistent due to the time of testing (early morning). Some subjects voided before arriving; others had not voided since the night before, leading to potentially unrepresentative urine samples.




**Mean ± SD of Urine and Saliva Osmolality Over Time (min)**

| | 0 | 30 | 60 | 30 | 60 | 90 | 120 |
|---|---|---|---|---|---|---|---|
| Urine | 629.2 ± 327.6 | 640.9 ± 322.7 | 770.2 ± 205.2 | 843.4 ± 225.7 | 774 ± 263.1 | 496.8 ± 320.5 | 249.1 ± 280.6 |
| Saliva | 82.5 ± 35.7 | 111.9 ± 40.5 | 145.4 ± 73.4 | 66.6 ± 18.5 | 60.5 ± 19.5 | 63.4 ± 21.3 | 62.2 ± 19.9 |

## Conclusion

Saliva osmolality does not highly correlate with urine osmolality, but that does not rule out saliva as a potential screening tool in determining hydration status. While salivary osmolality appears to be less precise than urine osmolality, it may be more sensitive to acute hydration changes.


## Methods

- 17 Division III, male collegiate athletes were recruited to participate.
- Collected saliva and urine samples every 30 min over 1 hour of aerobic exercise and 2 hours of rehydration.
- Exercise was performed on a Life Fitness 9500HR elliptical machine at 75-85% of maximum heart rate.
- Saliva was collected using the passive drool method and then frozen along with urine samples until testing.
- Fluids (water and Gatorade) equal to body weight lost were administered in three equal allotments during the rehydration period.
- Fiske 110-Osmometer was used to determine sample osmolality.
- Tanita BF-577 was used in taking subject weights at 0, 30, and 60 min to determine percent body weight lost.


## Future Research

- Assess the accuracy of salivary osmolality on an individual basis by taking multiple samples in a short time period at a constant hydration state.
- Assess the ability of salivary osmolality to predict urine osmolality by randomly testing a large sample of the general public without using the exercise protocol.
- Test women as well as men

## Acknowledgments

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