



# Effect of Urine Agitation on Measurements of Hydration Status

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## Context

•Hypohydration can have significant implications on physiological functions of the body and has the potential to decrease level of performance. Hypohydration can lead to increased thermal and cardiovascular strain.

•Athletic trainers are commonly required to attain urine specimen samples to assess athlete hydration status for weight checks and monitoring body mass losses. Unfortunately, immediate examination of urine samples is not always possible.

•As the urine sample sits, visible and non-visible sedimentation develops. No current literature addresses the sedimentation of urine samples and what procedures should be performed to ensure an accurate hydration assessment.

## Purpose

To determine if agitation of urine samples is comparable to the criterion measure, urine osmolality measured within 2 hours of collection.

## Methods

**Design:** Descriptive diagnostic validity study

**Setting:** Biochemical research laboratory

### Participants:

- Seventy-five healthy participants provided one or more samples
  - 41 males, 34 females
  - Mean age=22±5years
  - Mean self-reported height=172±23cm
  - Mean self-reported mass=77±17kg
  - Total samples=81

We recruited participants from a university campus

### Inclusion criteria:

- Between the ages of 18-60, physically active.

### Exclusion criteria:

- Chronic urinary tract infection, diabetes, or kidney disease

## Methods

**Independent Variable:** *Agitation Type*

- Hand Shake (HS)
- Vortex (Vtx)
- No Shake (NS)

**Dependent Variable:** *Osmolality (OSMO)*

### Procedures:

- Each participant completed informed consent and a health questionnaire
- We provided participants with clean specimen cup(s) to provide a sample(s)
- Within 2 hours of collection, we analyzed each sample using the osmometer, serving as the control.
- We split each sample into 3 cups. Samples were labeled according to agitation type and participant number.
- All samples were stored in a thermoneutral environment
- After 48 hours, we agitated each sample as per the experimental condition
  - HS: tipped 10 times in hourglass fashion (right side up to up side down)
  - Vtx: placed on vortex mixer for 10 secs at 3,000 RPM
  - NS: samples were not disturbed

### Statistical analysis:

- Significance was set *a priori* at  $p < 0.05$ .
- One-way analysis of variance (ANOVA) to compare the three methods of agitation against the control.

HS Agitation

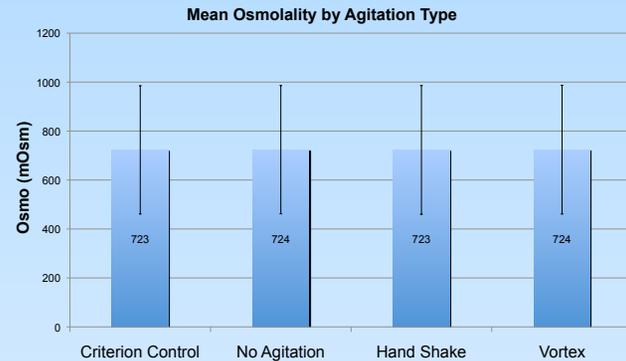


Vortex Mixer



Osmometer

## Results



•We identified no significant differences ( $F_{3,316} = 0.00027$ ,  $p = 0.99$ ,  $1-\beta = 1.00$ ) between agitation types and the control

- NS (mean=724 ± 262)
- HS (mean=723 ± 263)
- Vtx (mean=724 ± 263)
- Criterion control (mean=723 ± 262)

## Conclusions

- No differences in hydration status measurements between the three agitation methods and the criterion control.
- Agitation of urine specimen is not necessary in order to obtain a valid measure of hydration status using an osmometer.
- Immediate analysis within two hours of collection is not necessary.
- Athletic trainers and health care providers using urine samples for assessing hydration status can allow a urine sample to sit for up to 48 hours before analysis is performed.



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Department of Applied Medicine and Rehabilitation