A COMPARISON OF ELECTROLYTE-CARBOHYDRATE, ELECTROLYTE-AMINO ACID, AND WATER BEVERAGES ON REHYDRATION IN HEALTHY MEN AND WOMEN

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ABSTRACT

In cases of dehydration exceeding a 2% loss of body weight, athletic performance can be significantly compromised. Carbohydrate and/or electrolyte containing beverages have demonstrated efficacy for rehydration and recovery of performance, yet surprisingly, there is insufficient research on amino acid containing beverages in combination with electrolytes. **PURPOSE:** The purpose of this study is to compare the rehydration capabilities of electrolyte-carbohydrate (EC), electrolyte-amino acid (EA), and water (W) beverages. **METHODS:** Ten males (26.7 ± 4.58 years; 174.3 ± 6.36 cm; 74.2 ± 10.9 kg) and ten females (27.1 ± 4.72 years; 175.3 ± 7.87 cm; 71.0 ± 6.54 kg) participated in this double-blind, crossover study. Each participant visited the laboratory a total of 4 times. During the first visit, participants were familiarized with testing protocols. Visits 2-4 consisted of the following series of protocols with three different beverages consumed during the rehydration period: baseline measurements, dehydration, measurements, rehydration, followed by 4 more measurements immediately following rehydration and at 1, 2, and 3 hours post rehydration. Each visit was separated by a 7 day washout period. Each measurement session consisted of urine volume, urine specific gravity, drink volume, and water retention. The dehydration protocol consisted of 30 minutes of running at 80% maximum heart rate coupled with 15 minute sauna intervals until approximately 2% of body weight was lost. Rehydration beverages were administered in a randomized order and consisted of an EA beverage (Amino 1, MusclePharm), an EC beverage (Gatorade), and a W beverage (Crystal Light). **RESULTS:** No significant differences ($p > 0.05$) existed between beverages for urine volume, drink volume, or water retention for any time point. Condition x time interactions existed for urine specific gravity (USG) ($p<0.05$). Post hoc analysis revealed differences occurred between the W and EA beverages ($p = 0.003$) and between the EC and EA beverages ($p = 0.007$) at 4 hours after rehydration. **CONCLUSION:** Because there were no differences in urine volume, drink volume, or water retention, yet USG decreased, the EA supplement would appear to increase cellular rehydration. **PRACTICAL APPLICATIONS:** Athletes at risk for dehydration can adequately rehydrate using an EA beverage with possible benefits over an EC or W beverage. **ACKNOWLEDGEMENTS:** This investigation was supported by a grant from MusclePharm, Corp.

INTRODUCTION

In cases of dehydration exceeding a 2% loss of body weight, athletic performance can be significantly compromised. Carbohydrate and/or electrolyte containing beverages have demonstrated efficacy for rehydration and recovery of performance, yet surprisingly, there is insufficient research on amino acid containing beverages in combination with electrolytes [1-9]. However, the effects of BCAA's on rehydration remains to be investigated. Therefore, the purpose of this study was to compare the rehydrating effects of a BCAA-electrolyte (AE) beverage, CE, and flavored water (FW) control on exercise-induced dehydration and also to determine if a modest, more practical amount of these beverages in combination with water to compose the additional fluid requirement would provide adequate rehydration.

METHODS

Subject Characteristics

Table 1. Subject Characteristics. Data are presented as mean ± SD.

	N	Age (yrs)	Height (cm)	Weight (kg)
Men	10	18.67 ± 4.29	176.84 ± 8.19	73.01 ± 15.11
Women	10	19.19 ± 2.91	166.57 ± 6.50	61.77 ± 8.15

Procedures

1. Baseline measurements:
   - -Height
   - -Weight.

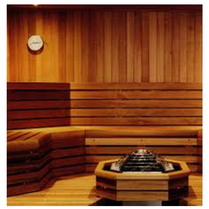
2. Dehydration protocol:
   - -30 minutes of running at 80% maximum heart rate
   - -15 minute sauna intervals
   - -Until approximately 2% of body weight was lost.

3. Measurements:
   - -Urine volume
   - -Urine specific gravity
   - -Drink volume
   - -Water retention

4. Rehydration beverages

Treadmill
- 30 minutes at 80% maximum heart rate

Sauna
- 15-20 minute intervals until 2% weight loss achieved



Urine Biomarkers

Glucose
Bilirubin
Ketones
Specific Gravity
Blood
pH
Protein
Urobilinogen
Nitrite
Leukocytes

Urine Specific Gravity

Urine Volume (ml)

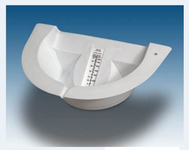


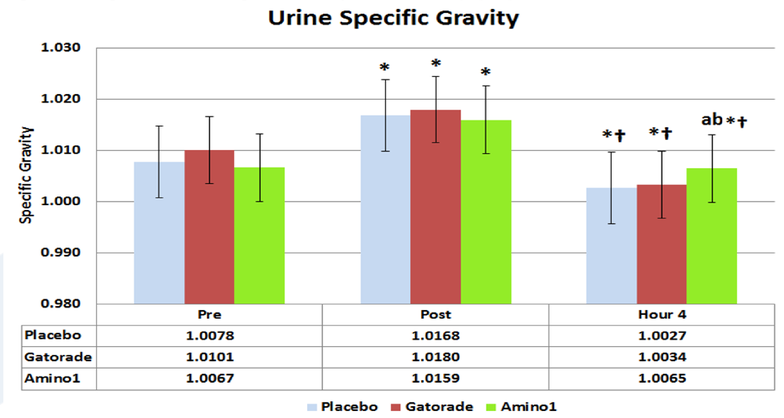
Table 2. Composition and amount of test beverage administered. The total amount of solute present is provided. Data are presented as mean ± SD.*

	W	EC	EA
Test Volume (mL)	770.8 ± 96.88	774.7 ± 100.9	772.5 ± 93.17
Calcium (mg)	.2 ± 0.02	7.9 ± 1.00	96.2 ± 11.31
Phosphorous (mg)	.2 ± 0.02	78.6 ± 9.98	116.3 ± 13.67
Magnesium (mg)	0	0	400.8 ± 47.12
Sodium (mg)	1.2 ± 0.14	311.7 ± 39.57	80.2 ± 9.43
Potassium (mg)	121.3 ± 14.86	120.5 ± 15.30	200.5 ± 23.57
BCAA (g)	0	0	6.0 ± 0.71
Carbohydrate (g)	.4 ± 0.05	52.4 ± 6.65	2.0 ± 0.24
Calorie (kcal)	8.9 ± 1.09	207.0 ± 26.27	10.0 ± 1.18

*Rehydration beverages :W beverage (Crystal Light), an EC beverage (Gatorade), and an EA beverage (Amino 1, MusclePharm).

RESULTS

Figure 1. Comparison of Urine Specific Gravity in three beverage groups.*



	Pre	Post	Hour 4
Placebo	1.0078	1.0168	1.0027
Gatorade	1.0101	1.0180	1.0034
Amino1	1.0067	1.0159	1.0065

*: Sig dif than Pre; †: sig dif than Post; **a**: sig dif than Placebo; **b**: sig dif than Gatorade.

CONCLUSIONS

Because no differences existed for fluid retention, urine or drink volume at any time point, yet USG returned to baseline during the EA trial, an EA supplement may enhance cellular rehydration rate compared to an EC or FW beverage in healthy men and women after acute dehydration of around 2% body mass loss.

PRACTICAL APPLICATIONS

Athletes at risk for dehydration can adequately rehydrate using an EA beverage with possible benefits over an EC or W beverage.

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