The Effects of Different Sports Beverages on Rehydration Among Runners

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Introduction

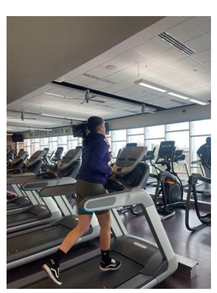
Endurance runners require recovery methods specific to their training and competition. Many endurance athletes prefer hydration, nutrition, sleep, and rest as the best and most effective way to recover. Many individuals do not learn how to assess how much hydration they will need before and after their run. Athletes should take responsibility for identifying their rehydration strategy, which means assessing their hydration status before exercise, assessing sweat rates, and the adequacy of current drinking behavior, and estimating the need for salt replacement. Dehydration impairing both physical and mental performance has already been established through studies and research. In cases of hypohydration, an individual's cardiovascular, musculoskeletal, and homeostatic temperature regulations have to work at greater intensities. While hydration has been studied numerous times before, this study adds insight into the reliability of the techniques we utilize in the athletic training field, the hydration needed by recreational runners, and the level of rehydration from new leading brands.

Research Goal

The purpose of this study was to determine which leading sports beverage is most effective in rehydrating active individuals after exercise.
A secondary purpose was to identify any differences between genders in hydration levels.

Methods

This IRB-approved (#IRB-AY23-24-298) study was a randomized control trial. Participants were 23(12M, 11F) active individuals, aged (23.87±3.29), weight (74.21±18.10) exercising 3-5 times per week and able to run for an hour comfortably. Exclusion criteria included currently menstruating females, lower extremity injury, pregnancy, history of heat illness, or diabetes. Pre-exercise body weight, urine, and blood were collected followed by a 45-minute indoor run (18.3℃). Participants were then randomly assigned to a treatment group (Gatorlyte, DripDrop, Liquid I.V.). Participants' post-run body weight, urine, and blood were collected, and their hydration needs were calculated(Pre-exercise wt - post-exercise wt x 1.5). Participants were released to rehydrate for two hours and were asked to only drink the beverage they were assigned in addition to a provided protein bar. Participants returned two hours later for post-hydration body weight, urine, and blood samples. The samples were stored in a fridge until data analysis in a medical laboratory. The dependent variables were urine specific gravity(SG) (calculated by digital refractometer), color (80% sensitivity accuracy), body weight, and urine and plasma osmolality (calculated with a Vapro-osmometer with less than 1% error rate). Data were analyzed using repeated measures analysis of variance(RMANOVA) with an alpha level of $p < .05$.



Figures and Results

	N	Mean	Standard Deviation
Height (cm)	23	171.85	11.36
Weight (kg)	23	74.21	18.10
Age (years)	23	23.87	3.29

Table 1: Participant demographics

	N	Mean	Standard Deviation
Height (cm)	8	170.28	8.73
Weight (kg)	8	68.84	15.18
Age (years	8	23.28	4.14

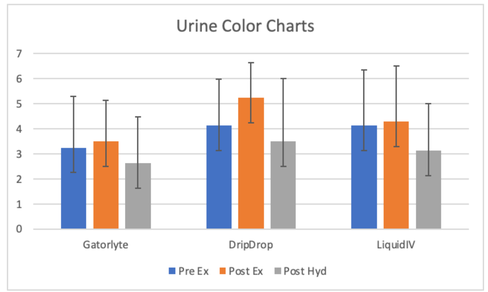
Table 2: Group 1 (Gatorlyte) participant demographics

	N	Mean	Standard Deviation
Height (cm)	8	169.50	15.45
Weight (kg)	8	71.13	15.67
Age (years	8	25.00	2.67

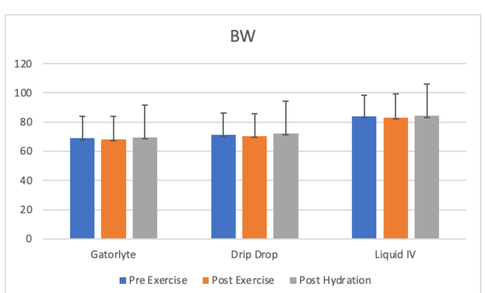
Table 3: Group 2 (DripDrop) participant demographics

	N	Mean	Standard Deviation
Height (cm)	7	176.21	8.54
Weight (kg)	7	83.89	22.03
Age (years	7	23.14	2.97

Table 4: Group 3 (Liquid IV) participant demographics



There was a statistically significant difference in each dependent variable from pre- to post-run: Specific Gravity ($t(22) = 687.637$ to $t(22)=670.647$, $p < .001$), Plasma Osmolality ($t(19) = 37.59$ to $t(19)=36.611$, $p < .001$), Urine Color Charts ($t(22) = 10.052$ to $t(22)=10.472$, $p < .001$), Urine Osmolality ($t(21) = 9.256$ to $t(21)=8.476$, $p < .001$), and Body Weight ($t(22) = 19.664$ to $t(22)=20.050$, $p < .001$). There was a statistically significant difference for time in participants' body weight regardless of beverage group($F(2,24)=10.522$,$p=.003$,observed power=.953). Participants' body weight(76.2±18.78) decreased following their run(75.5±18.7) and was regained with rehydration(77.06±18.6). There were no statistically significant differences in any of the other dependent variables or by group.



Discussion & Conclusion

This study found a significant difference between post-exercise and post-hydration for the DripDrop group only likely due to the increased amount of sodium found in this beverage. This study did find a statistical difference from pre- to post-exercise for each of the methods for measuring hydration indicating that exercising for 45 minutes is enough time to affect hydration levels in individuals. We also found a significant difference for time in urine color charts between pre-run and post-run and post-run and post-hydration in the DripDrop group indicating that this is a valid way to determine hydration levels in individuals. This study did not find a significant difference in hydration levels when utilizing specific gravity of urine, urine osmolality, or plasma osmolality indicating that more research should be done to determine the reliability of these methods.

This study was limited by participant numbers. Participants were able to drink ad libitum before enrolling in the study as no direction was given as to how much they could drink beforehand. Participants were only required to run for 45 minutes, which could either be done inside on the track or treadmill. Sports beverages are recommended for rehydration after exercising for an hour or longer. The running time of 45 minutes limited the amount of dehydration in each participant and made it more difficult to determine any differences between each beverage. For future research, we suggest determining the sweat rates of each participant before assigning them to groups to ensure balanced treatment groups. Additionally, participants should maintain a set rate of perceived exertion (RPE) during exercise to standardize exertion levels.

In conclusion, all three beverages had a similar effect on the hydration levels of the participants in the majority of the techniques used, however, urine color charts and body weight DripDrop showed a difference. These findings lead us to support the continued use of urine color charts and body weight as ways to determine hydration in active individuals in clinical settings.

Acknowledgments

Special thanks to our expert consultant Adrienne Carlson, BS, MLS(ASCP)^{CM} for training us in phlebotomy as well as medical laboratory techniques.

References