Bio-electrical Impedance

A Study of Hydration Status Among Athletes for Application in the Military Field Environment

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Background

- ZOE2
- Current clinical application
  - Information
  - Prevention

http://ehcny.org/uploads/images/Home%20Care%20Nursing.jpg

http://iraq.billhobbs.com/archives/092005.jpg

- Conditions of the field environment
- Hydration and the mission
- Need identified

Research Objectives

- Compare measurements from ZOE2 to ZOEW
- Compare sensitivity and validity of ZOE2 and ZOEW to asses mild hydration status changes post-exercise in a simulated field setting
- Assess test-retest ability of ZOEW monitor
- Assess usability of ZOEW monitor

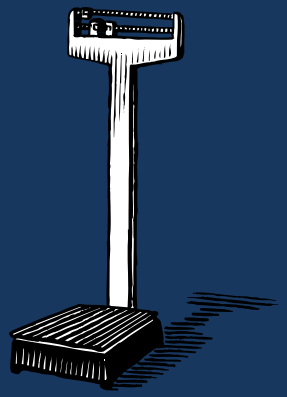
Experiment Design

- Institutional Review Board
- Recruitment of participants
  - Informed Consent
- Repeated Measures
  - ZOE2 (3 measurements)
  - ZOEW (3 measurements)
  - Nude Body Weight
  - Urine Specific Gravity
- Statistical Analysis

http://grfx.cstv.com/photos/schools/afa/sports/m-wrestl/auto_pdf/0708-WrestlingMG.pdf

Procedures

- Initial data collection
  - Nude body weight
  - Urine specific gravity
- Demonstration of product use
- Participant use



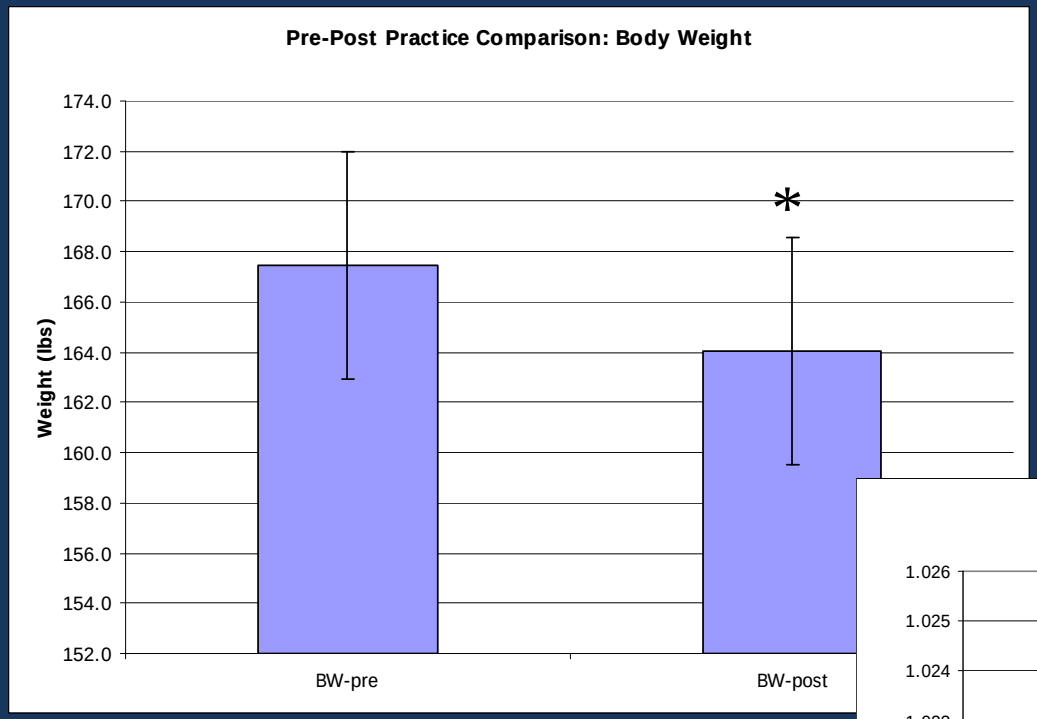
Procedures

- Participant practice
  - Water
- Repeated measurements
- Surveys
- Use of repeated measures ANOVA

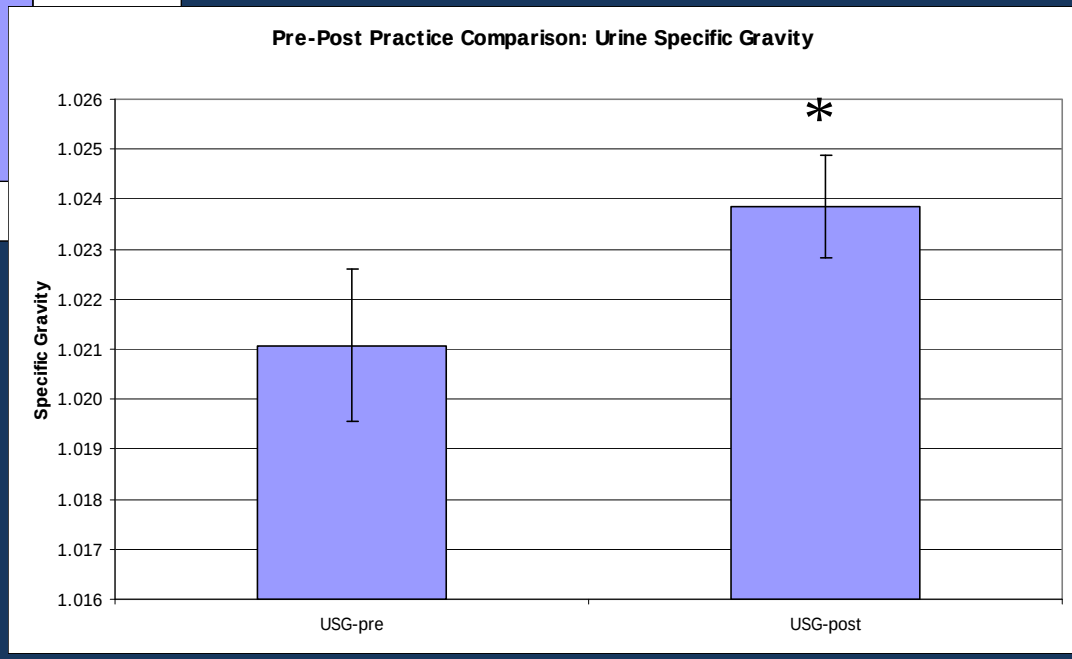
http://grfx.cstv.com/photos/schools/afa/sports/m-wrestl/auto_pdf/0708-WrestlingMG.pdf

Results

Body Weight and USG



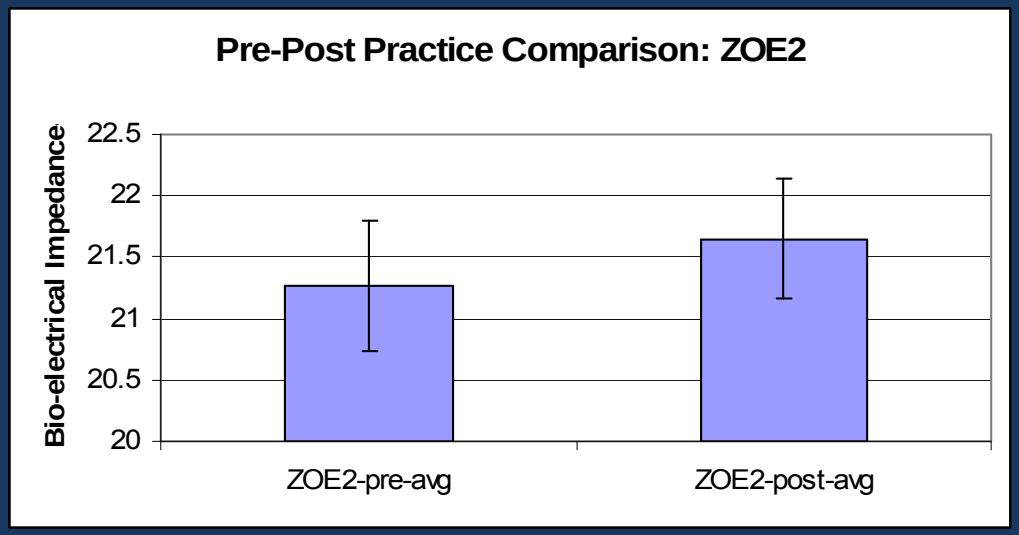
- Average weight loss of 3.5 lbs
- Significant increase in USG



* significant difference between pre- and post-practice ($p \leq .05$) (values are means ±SE)

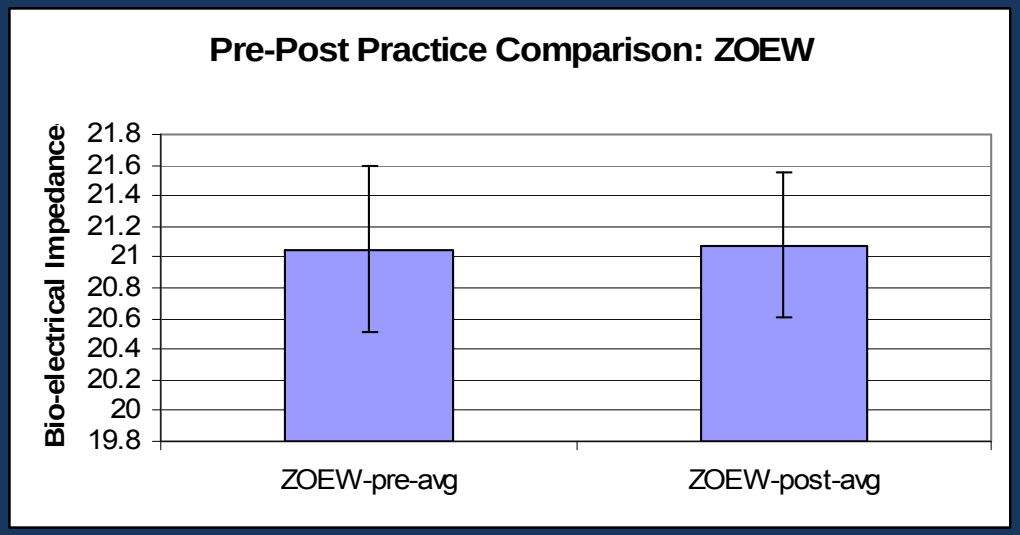
Results

Pre to Post-Practice Comparison of ZOE Measures



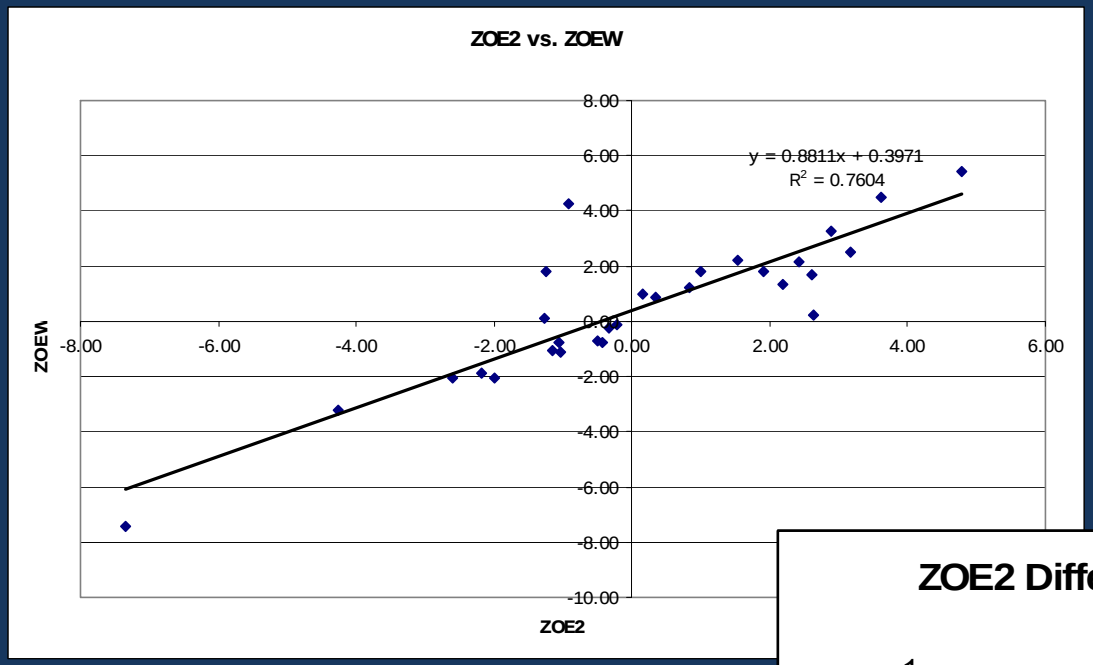
•ZOE2 (values are means ±SE)
No significant difference between pre- and post-practice (p=0.471)

•ZOEW No significant difference between pre- and post-practice (p=0.954)

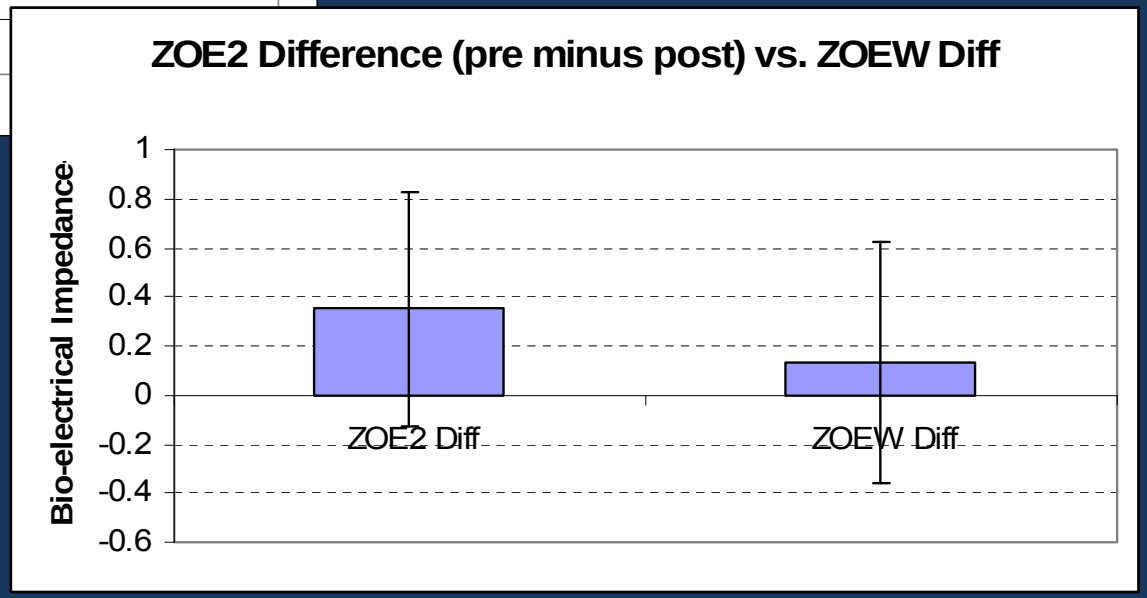


Results

Comparison of the ZOE2 and ZOEW Devices



- Pre-post practice ZOE2 difference plotted against pre-post practice ZOEW difference ($r = 0.96$, $p < 0.001$).

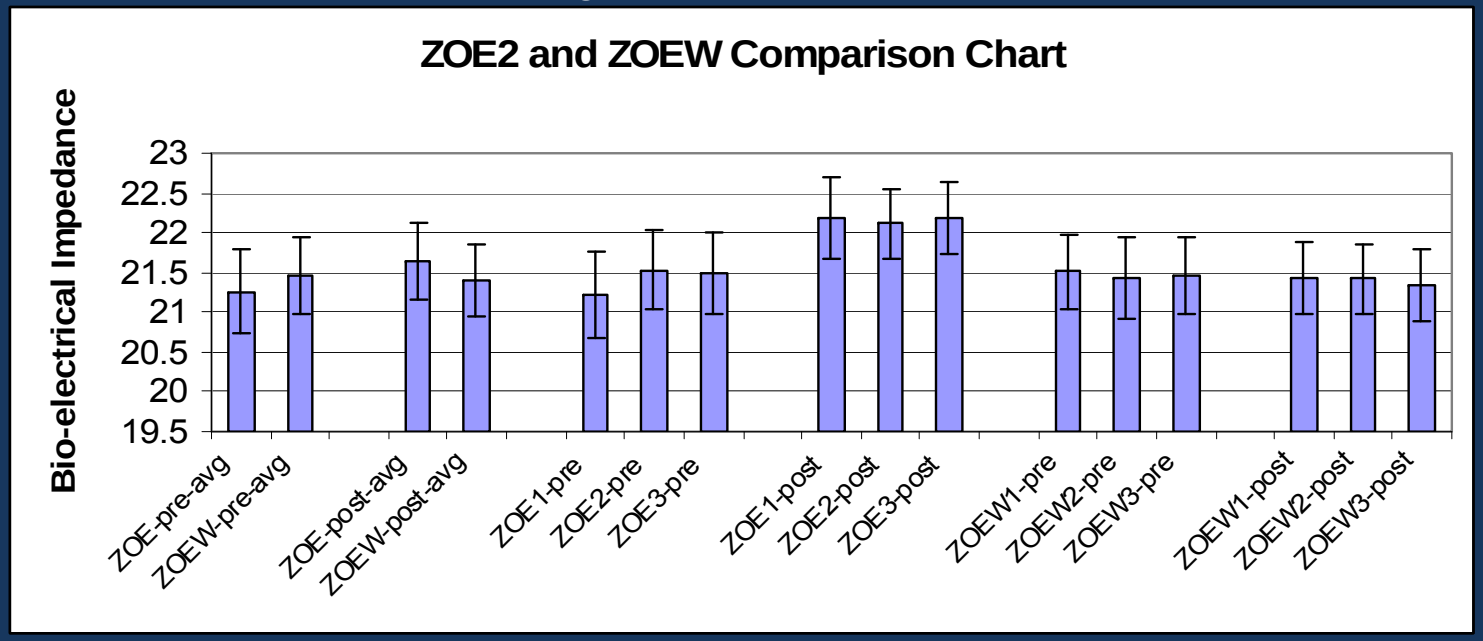


Results

Test-Retest Reliability

	ZOE1-pre	*ZOE2-pre*			*ZOE1-post*	*ZOE2-post*
ZOE2-pre	0.98**			ZOE2-post	0.95**	
ZOE3-pre	0.97**	0.98**		ZOE3-post	0.95**	0.97**
	ZOEW1-pre	*ZOEW2-pre*			*ZOEW1-post*	*ZOEW2-post*
ZOEW2-pre	0.97**			ZOEW2-post	0.96**	
ZOEW3-pre	0.98**	0.98**		ZOEW3-post	0.96**	0.97**

** Correlation is significant at the 0.01 level (2-tailed)



Discussion

- Comparable values
- Test-retest results
- User-friendly equipment
- USG and body weight changes
- ZOE2 and ZOEW results

Conclusions

- Interchangeably
- Current design not accurate in field environment compared to USG and BW
- Fielding ZOEW and ZOE2
- Results consistent with

other research findings

- Further research needed

http://www.floridaguard.army.mil/images/desert.jpg