

Cold Water Facial Immersion to Reduce Symptoms of Orthostatic Intolerance

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Background

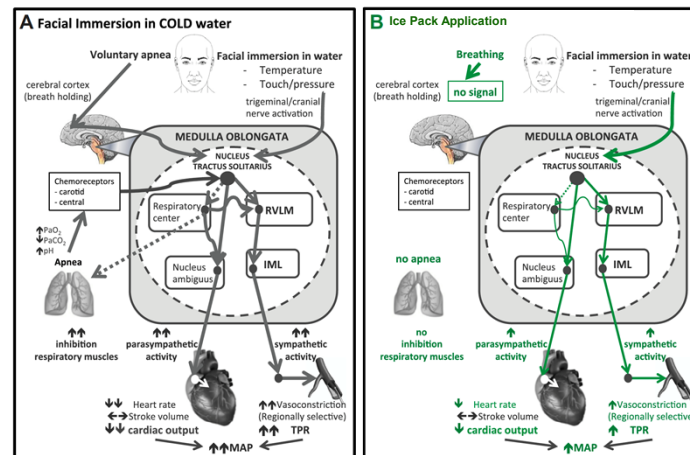
- Orthostatic intolerance affects upwards of 500,000 Americans including highly trained endurance athletes
- Aerobic adaptations such as cardiac hypertrophy and also plasma volume expansion contribute to a reduction in baroreflex sensitivity and therefore orthostatic intolerance in this group
- Orthostatic intolerance refers to the inability to maintain an upright posture without syncope and is defined as:
 - A reduction of at least 20 mmHg systolic blood pressure (SBP) or 10 mmHg diastolic blood pressure (DBP) within 3 minutes of standing
- Orthostatic intolerance contributes to cases of exercise associated collapse in highly trained endurance athletes
- Interventions that prevent orthostatic intolerance are needed while not interfering with aerobic adaptations
- Facial immersion in 0°C cold water, or an ice pack applied to the forehead and cheeks increases blood pressure (BP) and may therefore improve orthostatic intolerance in highly trained endurance athletes

Methods

- Participants are prepared for BP assessment
 - Manual sphygmomanometer
- Following, facial immersion in 0°C cold water, or an ice pack applied to the forehead and cheeks is performed (Figure 1)
- BP is measured immediately
 - Increases in BP are transient
 - Ice packs may have better practical application and effects on BP

Mechanisms

Figure 2. Effects of cold water facial immersion (A) and ice pack application (B) on BP



Adapted from: Choate JK, Denton KM, Evans RG, Hodgson Y. Using stimulation of the diving reflex in humans to teach integrative physiology. *Adv Physiol Educ.* 2014 Dec;38(4):355-65. doi: 10.1152/advan.00125.2013. PMID: 25434020.



Figure 1. Cold Water Facial Immersion

Interventions in the Literature

- Johnson et al. (2017)
- 10 young, healthy individuals completed 2 lower body negative pressure (LBNP) trials
 - Induces venous pooling and provokes orthostatic intolerance
 - During one trial, an ice pack was applied to the face and cheeks for 15 minutes during LBNP; other trial was a sham (thermoneutral)
 - The authors reported that the ice pack seemed to have offset the increase in venous pooling during LBNP
 - Results suggest that the decrease in SBP was lower during the ice pack trial
 - Potential limitations:
 - The study was not conducted in highly trained endurance athletes
 - Did not quantify cardiovascular fitness (i.e. VO2 max)

Conclusions

- Highly trained aerobic endurance athletes are at risk of orthostatic intolerance
 - Due to aerobic adaptations that result in reduced baroreceptor responsiveness
- Exercise and health professionals should recommend facial cooling to help increase BP and prevent syncope

References

- Johnson, B., Sackett, J., Sarker, S., & Schlader, Z. (2017, November 1). Face cooling increases blood pressure during central hypovolemia. *J Physiology.* 2003; 551: 601-609. doi: 10.1113/jphysiol.2003.046029
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- Ogoh S, Volianitis S, Nissen P, Walter Wrey D, Sechert, NH, Raven PB. *J Physiology.* 2003; 551: 601-609. doi: 10.1113/jphysiol.2003.046029