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EFFECTS OF ORAL SALT SUPPLEMENTATION ON PHYSICAL PERFORMANCE DURING A HALF-IRONMAN TRIATHLON

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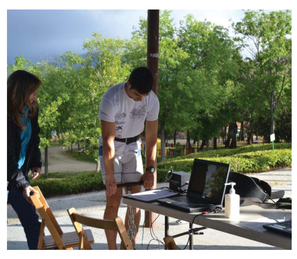
Introduction: Modern triathlon races are characterized by the continuous and sequential completion of swimming, cycling, and running sectors. During triathlon competitions, participants contest for the fastest overall race time, including timed transitions between the swim, bike, and run sections. Ultradistance athletes frequently consume salt supplements during competitions to compensate the loss of electrolytes by sweating. However, laboratory[1,2] and field[3,4] investigations present contradictory findings respect to the effectiveness of salt supplementation to improve physical performance, to maintain plasma volume and to preserve serum sodium concentration during endurance events.

Objective: To investigate the effectiveness of oral salt supplementation on improving exercise performance during a half-iron man triathlon.

Methods: Twenty-six experienced triathletes were matched for age, anthropometric data and training status and randomly placed into the salt group (113 mmol of Na^+ and 112 mmol of Cl^-) or control group (cellulose).
Both experimental and control treatments were provided in unidentifiable capsules and were ingested during the race.

Participants competed in a real half-ironman triathlon and race time was measured by means of chip timing.
Pre and post-race, maximal force during an isometric strength test, maximal jump height, and blood samples were obtained. Sweat samples were collected during the running section.



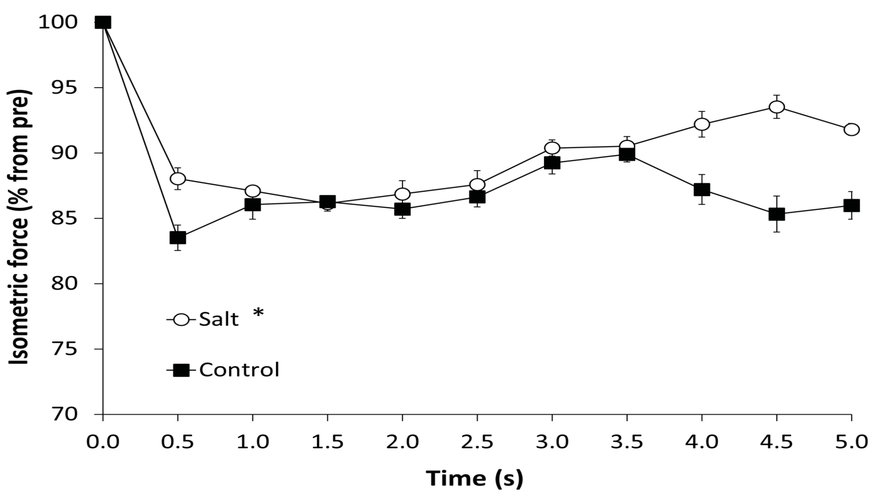


Figure 1. Changes (from pre-exercise values) in the isometric muscle force (* different from control, *P*<0.05)

Results: Total race time was lower in the salt group than in the control group (307±32 vs 333±40 min; *P*=0.04). After the race, the reduction in isometric strength was lower in the salt group (-10.6±0.8% vs -13.4±0.8%; *P*=0.01, Figure 1). However, jump height was similarly reduced in both groups (-14.0±5.3 and -18.4±3.5%, Table 1). Sweat losses (4.0±1.1 L) and sweat Na^+ concentration (48.4±15.9 and 45.7±20.9 mM) were similar between groups. However, body mass tended to be less reduced in the salt group than in the control group (-2.8±0.9% vs -3.4±1.3%; *P*=0.09).

Table 1. Performance, perceived exertion and leg muscle soreness (* different from pre, *P*<0.05)

Variable (units)		Control	Salt	*P* value
Swimming velocity (m/s)		0.75 ± 0.15	0.80 ± 0.08	= 0.14
Cycling velocity (m/s)		7.7 ± 0.8	8.3 ± 0.7	**= 0.04**
Running velocity (m/s)		3.1 ± 0.4	3.4 ± 0.5	= 0.06
Sweat loss (L)		4.0 ± 1.1	4.0 ± 1.1	= 0.98
Rehydration (L)		1.5 ± 0.6	1.9 ± 0.4	**= 0.05**
Body mass (kg)	Pre	73.4 ± 7.4	74.9 ± 7.7	= 0.64
	Post	70.9 ± 7.0	72.7± 7.4	= 0.26
Body mass change (%)		-3.4 ± 1.3	-2.8 ± 0.9	= 0.09
Perceived exertion (points)		16 ± 2	17 ± 2	= 0.51
Perceived muscle soreness (mm)		6.5 ± 1.5	6.9 ± 1.2	= 0.48
Jump height (cm)	Pre	30.9 ± 5.3	30.1 ± 5.1	= 0.70
	Post	25.0 ± 5.4*	25.4 ± 4.4*	= 0.86
Jump height change (%)		-18.4 ± 3.5	-14.0 ± 5.3	= 0.47

Post-race serum Na^+ and Cl^- concentrations were higher in the salt group (*P*<0.05,Table 2).

Table 2. Blood osmolality and serum electrolyte concentrations (* different from pre, *P*<0.05)

Variable (units)		Control	Salt	*P* value
Osmolality	Pre	290.9 ± 2.0	291.2 ± 3.8	= 0.91
(mOsm/kg)	Post	300.1 ± 5.2*	303.8 ± 5.3*	**= 0.02**
[Na^+] (mM)	Pre	141.4 ± 1.3	141.8 ± 1.1	= 0.58
	Post	143.4 ± 2.2*	144.9 ± 1.8*	**= 0.03**
[Cl^-] (mM)	Pre	99.9 ± 1.4	99.8 ± 1.8	= 0.81
	Post	99.5 ± 2.2	101.7 ± 2.5*	**= 0.01**
[K^+] (mM)	Pre	4.1 ± 0.3	4.0 ± 0.2	= 0.64
	Post	4.7 ± 0.3*	4.7 ± 0.4*	= 0.78

Conclusion: Oral salt supplementation might be effective not only to increase performance but also to maintain serum electrolytes concentrations during a real half-ironman competition.

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