CARTAS AL EDITOR

Effects of different fluid replacements following dehydration on circulating lactate levels

Dear editor: Sport beverages contain electrolytes and carbohydrates, rather than just water, and are recommended to maintain hydration during high endurance exercise at high ambient temperatures.[1] However, the benefit of sport beverages over water alone for short-term, high intensity exercise, after dehydration, has not been consistently demonstrated. Knowledge of the most effective fluid supplementation to improve exercise performance would be particularly important for athletes who use 'forced' dehydration in a sauna to achieve rapid weight-loss prior to competition, such as in wrestling and mixed-martial-arts.[2] The purpose of our study was to compare the effects of mineral water to a sport beverage for fluid replenishment after forced dehydration on lactate levels at rest and after high intensity treadmill exercise.

Participants were seven male university students, with an unremarkable medical history, and the following relevant characteristics: mean age, 24.57±2.15 years; mean height, 172.27±8.39 cm; mean weight, 67.57±7.58 kg; and mean VO_2max, 51.07±13.12 ml/kg/min. The dehydration protocol was standardized to induce a 3% decrease in body weight through fluid loss.[3] Fluid supplementation was provided within 2 h of dehydration using two types of supplements, mineral water and a sport beverage containing 6% carbohydrate, 20.9 mEq/L Na^+, 6.1 mEq/L K^+, and 9.5 mEq/L Cl^-. The graded treadmill exercise test to exhaustion (GXT; intensity of 80% VO_2max) was used for exercise testing. Blood samples for measurement of lactate levels were obtained at baseline (prior to the exercise), at the 15 min time point of exercise, immediately upon cessation of exercise, and at 60 min post-exercise. The GXT was completed under four conditions: control (no prior dehydration), dehydration, dehydration followed by fluid supplementation with mineral water, and dehydration followed by fluid supplementation with the sport beverage. Plasma lactate levels were measured using a clinical chemistry analyzer (Ektachem DT 60; Eastman Kodak, Rochester, NY, USA).

Differences in lactate levels at each time point of measurement were evaluated using a two-way repeated analysis of variance (ANOVA; SPSS Inc., Chicago, IL, USA; $p<0.05$). Lactate levels for the four conditions, at each time point of measurement, are reported in table I. A significant main effect of time and group on plasma lactate levels was identified, as well as a significant time by group interaction. Post-hoc analysis revealed a continuous increase in lactate levels, from baseline, through to immediately upon cessation of exercise, followed by a significant decrease at 60 min post-exercise for all groups. Lactate levels at the cessation of exercise were significantly higher for the dehydration than the control condition ($p<0.05$).

Dehydration prior to exercise accelerates the production of lactate, and both mineral water and a sport beverage are effective in reducing the levels of lactate produced.

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Table I
Change in lactate level by exercise according to fluid replenishment method after dehydration

Condition/ time	Baseline	At the 15 min time point of exercise	Immediately upon cessation of exercise	60 min post-exercise
Control	1.10±0.34	6.40±1.43*	7.04±2.35*	1.09±0.49
Dehydration	1.24±0.73	7.84±1.72*	9.79±1.18*,‡	1.44±0.38
Water supplement after dehydration	0.97±0.21	6.99±0.76*	7.47±1.27*	1.39±0.43
Sports beverage supplement after dehydration	1.50±0.23	6.60±0.93*	7.37±1.62*	1.31±0.21

	F	p
Time	6.908	0.003
Group	286.665	<0.001
Interaction	2.736	0.010

Data are presented as mean ± standard deviation (Unit: mmol/l)

* Significantly different from rest in all trials (p<0.05)
‡ Significantly higher in dehydration than control trial (p<0.05)

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Lung cancer mortality trends in Mexico, 1999-2014

Dear editor: Lung cancer (LC) is the number one cause of death among all cancers worldwide[1] and in Mexico.[2] LC mortality rates in Mexico increased for both sexes between 1970 and 1999,[3] but recent studies have shown a favorable decreasing trend.[4,5] However, these studies included all ages in the analysis, or specific age groups (30-74, 35-64, 0-80 years of age), resulting in variable mortality rates. Considering that the majority of malignant lung neoplasms (97%) are usually seen in those age ≥40 years it would be more accurate to determine mortality rates in this population. In this letter we compare the age-standardized mortality rates (ASMR) of LC in people of all ages (ASMR-all) vs people age ≥40 years (ASMR≥40), to determine the degree of underestimation if all ages are considered; compare medians of ASMR≥40 for the periods before and after 2008, when new tobacco taxes and laws were implemented in Mexico, to determine their impact on LC mortality, and determine trends of age-specific rates and of ASMR for the period 1999-2014.

De-identified LC mortality and population growth data were obtained from official websites.[6,7] ASMR were calculated according to the World Standard Population[8] and joinpoint regression analysis[9] was used to determine national rate trends. Lung cancer deaths were identified as ICD-10th codes C33 and C34.

The results showed that ASMR≥40 were about three times higher than ASMR-all (table I). Compared to the first period (before 2008), the ASMR≥40 medians of the second period (after 2008) decreased from 26.6 to 20.5 overall, from 15.8 to 13.6 in females and from 38.7 to 28.3 in males. All changes were statistically significant (p<0.001, data not shown). From 1999 to 2014, the annual percent change (APC) of age-specific rates decreased for the whole sample, for females and for males (table II). The largest decline was seen in males aged 65-69, from 2004 to 2008 (APC -8.0). From 1999 to 2014, the ASMR≥40 decreased 36% in the whole sample, 25.6% in females and 39.8% in males, with an APC of -3.0, -2.1 and -3.3, respectively (p<0.05). Higher APC from 2008 to 2014 were found in the whole sample (-3.4) and in males (-4.0) (figure 1, tables I and II). This study shows that LC's ASMR will be underestimated about threefold if all ages are considered in the analysis. Trend analysis showed a persistent favorable trend in LC mortality in Mexico, which is likely associated with the implementation of smoking laws and taxes in 2008, and the decrease over time of the prevalence of smoking[10,11] and of the use of wood as the main cooking fuel.[12] Prevalence of biomass smoke exposure (BSE) resulting from cooking is still high in rural areas of Mexico (44.5% in 2012-2013[12]) and has been associated with lung cancer in Mexican women,[13] who usually perform the cooking. BSE may be contributing to the slower pace of decrease in ASMR in women, as they have a lower smoking prevalence than men.