ISSN 2010-3093

RESEARCH BRIEF

No. 13-001

Sweat and Thirst—The Exercise Hydration Knowledge of Singaporean Youths

Michael Chia, Swarup Mukherjee and Dynelle Huang

INADEQUATE HYDRATION before, during and after exercise puts the safety and well-being of Singaporean youths at risk especially when sports training and Physical Education (PE) lessons are conducted outdoors, under the hot and humid weather conditions of Singapore. The study examined the exercise knowledge of youth athletes in Singapore schools: 586 youth athletes from four primary schools, four secondary schools and one junior college. All participants completed a validated exercise hydration knowledge quiz that was developed based upon the consensus statements and position stands of two international sports associations. An average knowledge score of 44.7±14.0% (range 0–87.1%) was obtained, which was significantly below the minimum competence score of 80%. Post-exercise hydration knowledge was lacking when compared to pre-exercise and during-exercise hydration knowledge. Overall, exercise hydration knowledge gaps were identified, in particular for post-exercise hydration; still the majority of participants from all schooling levels did not attain the competence score of at least 80%. Coach education and PE training programmes should specifically target and ameliorate these knowledge deficiencies to empower youth athletes to take personal responsibility for their safe participation and training in sports.

INTRODUCTION

Previous work had suggested that male adolescents who arrived for an inter-school 4-a-side hockey tournament, where the mean overall cumulative heat exposure was 54 minutes, were already in danger of dehydration. Out of the adolescents, 97.5% arrived at the

KEY IMPLICATIONS

- Policymakers should consider including specific education courses for all adolescents on exercise hydration knowledge.
- PE educators can teach and empower youth athletes to take ownership and personal responsibility for adequate hydration before, during and after exercise.
- Coach education and physical education training programmes should have specific exercise hydration courses to equip both coaches and PE teachers with the requisite knowledge for safe participation, optimal training and competition performance of youths.

tournament site already showing signs of dehydration ($Urine_{SG}$>1.010), increasing to 100% after the tournament. Body mass changes amounted to 3.25% (p<0.05) demonstrating significant dehydration among players, despite three drink types being freely available throughout the tournament (Chia & Mukherjee, 2012).

Future plans by the Ministry of Education to double Physical Education (PE) periods in schools will plausibly increase the risk among exercising youths to heat-associated disorders if care is not taken and knowledge deficiencies not addressed. To safeguard the health of physically active youths, it is essential to understand the existing exercise hydration knowledge before strategies and programmes can be developed to counter knowledge deficiencies. Associated research data are sporadic, and are largely focused on un-acclimatized athletes. The study examined the exercise hydration knowledge of Singaporean school-going youths.

RESEARCH DESIGN

After institutional ethics clearance (IRB 11/04/14) was granted, 586 youth athletes (13.91±2.53y, male=322, female=259, 5 participants did not identify their gender in the quiz) from four primary schools (number=231, 11.37±1.13y), four secondary schools (number=219, 14.51±1.14y) and one junior college (number=136, 17.25±0.76y) participated in the study.

All participants completed an exercise hydration knowledge quiz where adequate knowledge was accepted as a score of at least 80%, consistent with acceptable competence for knowledge-based tests (Ransone & Dunn-Bennett, 1999) and certification standards of the Singapore Red Cross. The questionnaire was developed based upon the position stands on fluid replacement for athletes (Casa et al., 2000; Sawka et al., 2007) set by the American College of Sports Medicine (ACSM) and the National Athletic Trainers' Association (NATA)—two renowned international sports associations.

Content and construct validity was established jointly by two internationally certified exercise physiologists, at least two school teachers from primary and secondary schools in Singapore (for language comprehension), and an international accredited nutritionist.

KEY FINDINGS

Singaporean youths involved in sport Co-Curricular Activities (CCAs) lack the adequate exercise hydration knowledge for safe participation, optimal training and sports performance. Out of the participants, 82.3% were involved in team sports. An average knowledge score of 44.7±14.0% was obtained. Post-exercise hydration knowledge was lacking when compared to pre-exercise and during exercise hydration knowledge (Mean pre=47.2±22.0%, during=48.7±16.9%, post=36.3±18.3%). Questions relating to hydration monitoring and the appropriate choice of beverage were answered poorly. Overall, 46.9% responded that their teachers and coaches were their main sources of exercise hydration knowledge.

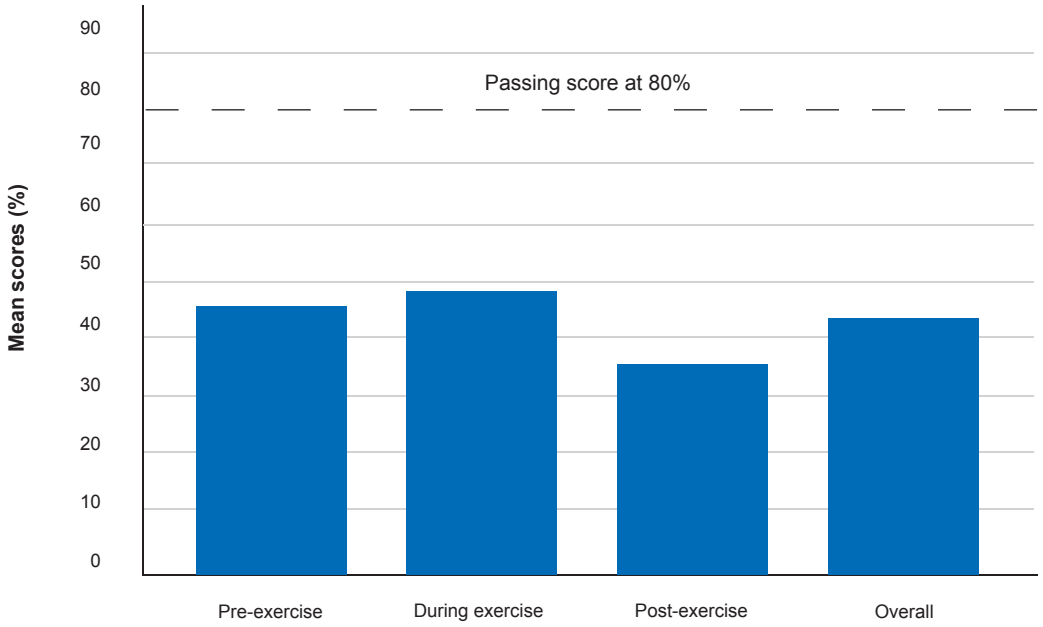

Figure 1. Overall hydration mean scores of youth athletes showing that youth athletes did not attain a passing score of 80%.

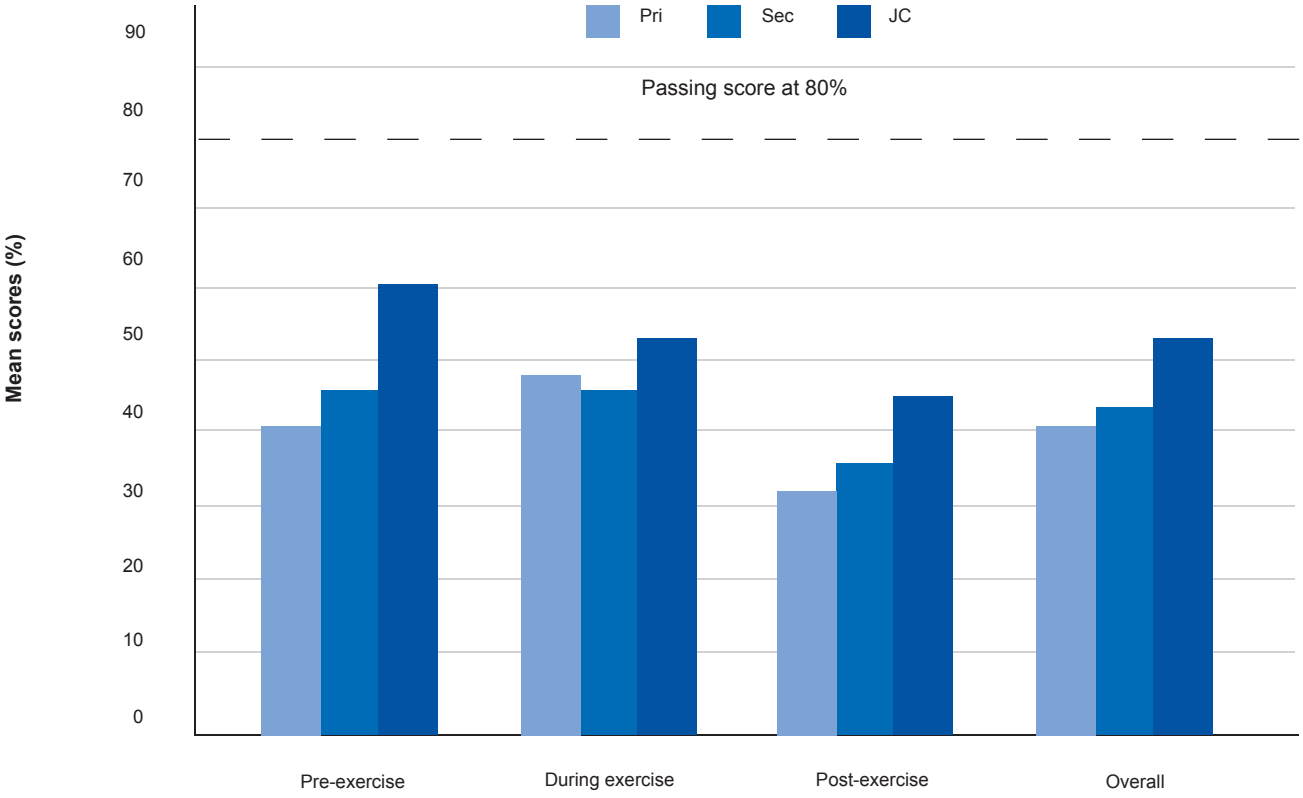

Figure 2. Comparison of hydration knowledge mean scores between primary, secondary and junior college levels.

Senior youth athletes were largely self-taught (Pri=21.6%, Sec=41.6%, JC=52.2%) and were less reliant on their parents (Pri=52.4%, Sec=27.9%, JC=19.9%), and coaches and teachers (Pri=52.8%, Sec=45.2%, JC=39.7%) for hydration knowledge. Notwithstanding, JC seniors scored significantly higher in knowledge scores compared to their secondary school and primary school counterparts (JC=53.3±13.9%, Sec=43.1±14.1%, Pri =41.1±11.8%, $p<0.05$). Overall, exercise hydration knowledge gaps were identified, in particular for post-exercise hydration; but the majority of participants from all schooling levels did not attain the competence score of at least 80%. The mean exercise knowledge score was 35.3 points below this acceptable score (see Figures 1 and 2).

IMPLICATIONS

For Policy

Policymakers should consider including specific education courses for all adolescents who are involved in sport CCAs on exercise hydration. These can be based upon the most recent position statements of international organizations, such as the ACSM and the NATA, in the school PE and CCA programmes.

For Practice

In-service PE educators should be made aware of the dangers of dehydration, and the preventive measures and management of dehydration. These teachers will then be in a better position to teach and empower youth athletes to take ownership and personal responsibility for adequate hydration, before, during and after exercise.

For Teacher Training

More effort should be made to heighten the awareness and knowledge of international guidelines for exercise hydration of adolescent youths exercising in the heat. Coach education and physical education training programmes should have specific exercise hydration courses to equip both coaches and PE teachers with the requisite knowledge for safe participation, optimal training and competition performance of youths.

REFERENCES

Chia, M., Mukherjee, S. (2012). Hydration status of heat-acclimatized youth hockey players during competition. *Science & Sport*, *27*, e51–e54.

Casa, D. J., Armstrong, L. E., Hillman, S.K., Montain, S. J., Reiff, R. V., Rich, B. S. E., ... Stone, J. A. (2000). National athletic trainers' association position statement: fluid replacement for athletes. *Journal of Athletic Training*, *35*(2), 212–224.

Ransone, J. & Dunn-Bennett, L. R. (1999). Assessment of first-aid knowledge and decision making of high school athletic coaches. J*ournal of Athletic Training*, *34*(3), 267–271.

Sawka, M. N., Burke, L. M., Eichner, E. R., Maughan, R. J., Montain, S. J., & Stachenfeld, N. S. (2007). Exercise and fluid replacement. *Medicine and Science in Sports and Exercise*, *39*(2), 377–390.

ABOUT THE AUTHORS

Michael CHIA, Swarup MUKHERJEE, Dynelle HUANG are with the National Institute of Education, Nanyang Technological University, Singapore.

Contact Professor Chia at **michael.chia@nie.edu.sg** for more information about the project.

This brief was based on the project OER 22/10 MC: Hydration and Fluid Replacement Knowledge, Attitudes and Behaviours in Heat-Acclimatized Singaporean Youths.