ORIGINAL ARTICLE

Knowledge and Attitudes Towards Fluid Hydration of Athletes by Jamaican Track and Field High-school Coaches

T Redwood[1], A Mansingh[1], D Bourne[2], N Wade[1], P Singh[1]

ABSTRACT

Objective: *To determine whether or not Jamaican coaches' knowledge and practices of fluid replacement are on par with that of the National Athletic Association's and the American College of Sports Medicine Standards.*

Methods: *A descriptive survey of 90 high-school track and field coaches in Jamaica was conducted. Coaches were given a 29-item survey questionnaire which adapted the content from previous surveys and also based on the National Athletic Trainers' Association guidelines for fluid replacement and information sources of fluid replacement. A pass score of 80% was employed.*

Results: *Approximately 26.6% of participants passed the knowledge-based assessment with the minimum requirement of 80% and 73.4% of participants had an unacceptable level of knowledge about fluid replacement and hydration. Only 26 (28.9%) coaches received training in fluid replacement therapy. Most of them therefore relied on reading materials ranging from magazines to journals, or learnt it on the job from other coaches.*

Conclusion: *Findings suggest that the level of knowledge in Jamaican track and field high-school coaches about fluid replacement and hydration is very poor. However, their attitudes towards fluid replacement and hydration are very good, and this will facilitate their acceptance and adoption of correct fluid replacement guidelines. Tapping into this positive attitude and implementing workshops, seminars and onsite promotion should improve the coaches' knowledge significantly.*

Keywords: Athletes, fluid replacement, high-school coaches, Jamaican, track and field.

INTRODUCTION

The effects of dehydration and benefits of rehydration in sports have been an area of interest for over 70 years; heat illness during practice or competition is the third leading cause of death and disability among high-school athletes in the United States, especially in football (1, 2). During exercise or competition, optimal body temperature is maintained by sweating, resulting in loss of body fluid. Fluid intake increases based on environmental temperature and physical activity intensity (3). Maintaining adequate hydration maintains muscle function, and decreases the risk for heat stroke and lethargy (4).

Dehydration may be due to hypohydration (dehydration induced prior to exercise) and/or exercise-induced dehydration (2, 5). Both reduce aerobic endurance performance and result in increased body temperature, heart rate, perceived exertion, and heat-related illness. Mild (< 2%) dehydration reduces physical performance, whereas 5% dehydration affects mental performance (6).

High-school athletes rely on their coaches for advice relating to their training and nutrition, including proper nutrition, supplement use, weight gain and loss, pre- and post-competition nutrition and hydration (7, 8). This reliance diminishes as the athletes get older where they seek their own knowledge (9). There

From: Section of Sports Medicine, Mona Academy of Sport, Faculty of Sport, The University of the West Indies, Kingston 7, Jamaica and [2]Kingston Public Hospital, North Street, Kingston, Jamaica.

Correspondence: Dr A Mansingh, Faculty of Sport, The University of the West Indies, Kingston 7, Jamaica. Email: akshai.mansingh@uwimona.edu.jm

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are few studies related to coaches' knowledge of hydration (5, 7) and none in Jamaica and the Caribbean. A study in the United States revealed that a large portion of high-school athletic coaches needed additional education related to fluid replacement and hydration (10). A Singapore-based study on 40 male adolescent field hockey players showed that 97.5% of these athletes were already dehydrated prior to competition and at the end 100% were dehydrated (11).

High-school track and field events, in particular, the annual Boys and Girl Event ('Champs'), are culturally entrenched in Jamaican's lives. The High-School Athletics Championships of Jamaica attracts the best athletes of the nation, and is among the top high-school championships in the world. There has been no study done in Jamaica to explore the knowledge and attitudes of Jamaican high-school track and field coaches regarding fluid hydration in their athletes.

The purpose of this study is to assess the knowledge of Jamaican high-school track and field coaches as it relates to fluid hydration and to determine if they are adhering to the National Athletic Association's and the American College of Sports Medicine guidelines.

METHODS AND SUBJECTS

A descriptive survey was carried out via an assisted self-directed questionnaire. All accessible high-school coaches in Jamaica who participated in the National Boys and Girls High School Championships in 2012 were the targeted population. There were 216 schools that participated but not all had coaches. To obtain a representative sample with 95% confidence and a margin of error of 8%, it was estimated that a minimum of 89 participants were required (12).

The study was approved by the University Hospital of the West Indies/The University of the West Indies/ Faculty of Medical Sciences Ethics Committee. The coaches were informed that participation in the study was voluntary; there were no sanctions for non-participation or withdrawal; and no incentives were provided.

A 29-item survey questionnaire was designed adapting the content from previous surveys (2, 8, 10) and also based on the National Athletic Trainers' Association (NATA) guidelines for fluid replacement (13) and information sources of fluid replacement (14, 15). Previous studies utilizing this questionnaire on fluid replacement management used 80% as a pass score (16–18). This pass rate was also employed to this study. The survey information categories were socio-demographic and occupational characteristics relating to age and gender of each coach, years of coaching experience, type of high school, gender, formal training; source of information about fluid replacement and dehydration; knowledge to evaluate the coach's knowledge of fluid replacement guidelines.

Each questionnaire was assigned a random number to anonymize the respondent. Statistical analysis was done using SPSS statistical software version 12.0 (SPSS Inc., Chicago, IL, USA). Correct answers were given a score of 1. Participants were considered to have adequate knowledge towards fluid rehydration if they correctly answered 80% of the questions.

Logistic regression analyses and Levene's test for equality of variances were used to examine and identify associations between knowledge, attitude and experience variables. Statistical significance was reported at $p < 0.05$.

RESULTS

Demographic and occupational training characteristics

Ninety coaches (90% of intended sample size) participated and 10% of the intended sample size opted not to participate. There were 9 (10%) females and 81 (90%) males. The age of 75 (83.3%) participants ranged from 18 to 67 years with a mean age of 37.4 years. The majority of coaches (78, 86.7%) worked at co-education schools (58, 74.4%), 15 (19.2%) in male schools and 5 (6.4%) in female schools. A total of 80% of coaches had formal coaching experience which ranged from 0.5 to 40 years (mean 12.2 years).

Approximately 80 (88.9%) coaches received formal training, 55 (61.1%) additional training in exercise physiology and only 26 (28.9%) received training in fluid replacement therapy. Most of them therefore relied on reading materials ranging from magazines to journals, or learnt it on the job from other coaches (Table 1).

Table 1: Source of information for fluid hydration

Sources	Yes n (%)	No n (%)
Magazines	49 (54.4)	41 (45.6)
Texts	42 (46.7)	48 (53.3)
Colleagues	65 (72.2)	25 (27.8)
Professional journals	44 (48.9)	46 (51.1)
Medical staff	61 (67.8)	29 (32.2)
Professional conferences	56 (62.2)	34 (37.8)
Professional organizations	34 (37.8)	56 (62.2)
Brochures	53 (58.9)	37 (41.1)

Knowledge, attitude and opinions on fluid rehydration characteristics

Coaching experience was not found to affect the number of correctly answered questions ($p > 0.124$).

Only 26.6% of coaches correctly answered 80% or more of the questions. The findings were enlightening regarding coaches' knowledge: 78.9% incorrectly considered thirst an early indicator of dehydration; 73.3% knew that hydration status could be monitored using urine colour; 66.7% knew that body weight before and after training could be used to determine how much fluid needs to be consumed, though 27.8% thought this to be untrue. Over 90% appreciated that dehydration affected performance and increased the risk of heat-related illnesses.

Pre-competition and post-competition hydration characteristics

Although 96.7% of coaches agreed that athletes need to be well hydrated prior to competition, their knowledge regarding the amount of fluids to be consumed and the timing of intake was not clear. From the responses, 38.9% knew that water was not as effective as a sports drink containing carbohydrates and electrolytes, whereas 58.9% thought it was. The concentration or type of carbohydrate needed was not well known. There was also uncertainty about the amount of fluid to be replaced following exercise with only 24.4% knowing that replacing 150% of fluid lost was incorrect. The more detailed the questions got, the more the 'don't know' option was chosen.

Suggestions given by the coaches on the ways to improve rehydration practices of coaches included seminars and workshops held throughout the year.

DISCUSSION

The annual Boys and Girls Athletic Championship is a multisport high-school athletic meet in Jamaica. This event has propelled the career of many internationally successful Jamaican athletes. The current study examined the knowledge and attitudes relating to fluid hydration of athletes by track and field high-school coaches in Jamaica.

Due to the large volume of fluid loss during physical exertion, the management of fluid replacement is vital in achieving optimal performance from athletes (5). The study results suggest that almost 74% of Jamaican coaches had an inadequate level of knowledge as it relates to adequate hydration in athletes; however, 96.7% of coaches agreed that athletes need to be well hydrated

Table 2: Knowledge assessment: coaches' responses for fluid hydration

Question	Yes, n (%)	No, n (%)	Don't know n (%)
1. Thirst is an early indicator that the athlete needs fluid	71 (78.9)	19 (21.1)	–
2. Monitoring urine colour is the best way for an athlete determine if he/she is dehydrated	66 (73.3)	20 (22.2)	4 (4.4)
3. Comparing body weight before and after training/competition is not a useful way to determine how much fluid needs to be consumed	25 (27.8)	60 (66.7)	5 (5.6)
4. Dehydration improves performance in endurance athletes	5 (5.6)	84 (93.3)	1 (1.1)
5. Dehydration increases the risk of experiencing heat-related illnesses, such as heat cramps, heat exhaustion, *etc*	85 (94.4)	3 (3.3)	2 (2.2)
6. Exercise or physical activity in hot and humid conditions has no effect on dehydration	11 (12.2)	79 (87.8)	–
7. Athletes should begin each training session or competition well hydrated	87 (96.7)	1 (1.1)	2 (2.2)
8. 2–3 hours prior to exercise an athlete should aim to consume 500–600 ml of fluid	70 (77.8)	9 (10.0)	11 (12.2)
9. 10–20 minutes before competition, an athlete should aim to consume 200–300 ml of fluid	53 (58.9)	24 (26.7)	13 (14.4)
10. Fluid replacement during exercise should, at the very minimum, prevent dehydration of greater than 2% body weight reduction	72 (80.0)	11 (12.2)	7 (7.8)
11. During endurance training or competition that exceeds more than 50 minutes, water is equally as effective as a sport drink containing carbohydrates and electrolytes	53 (58.9)	35 (38.9)	2 (2.2)
12. Post exercise fluid replacement should be approximately 150% of the fluid lost during activity	53 (58.9)	22 (24.4)	15 (16.7)
13. Sports drinks, if being digested during exercise, should have a carbohydrate concentration of at least 8%	54 (60.0)	19 (21.1)	17 (18.9)
14. The main form of carbohydrate in a sports drink should be fructose	35 (38.9)	33 (36.7)	22 (24.4)
15. Sodium should be included in fluid replacement beverages if the physical activity lasts 4 or more hours	66 (73.3)	12 (13.3)	12 (13.3)
16. The addition of sodium and carbohydrate to the re-hydration beverage, after exercise, will speed up rehydration and replenish glycogen stores	71 (78.9)	8 (8.9)	11 (12.2)
17. During recovery, athletes should aim to re-hydrate within a 2-hour period after exercise	74 (82.2)	13 (14.4)	3 (3.3)

prior to competition. Juzwiak and Ancona-Lopez in 2004 (8) conducted a study that evaluated nutrition knowledge and dietary recommendation by coaches of adolescent Brazilian athletes: 95% of coaches recommended fluid hydration with the main reason for fluid intake being heat and fluid loss, 69% of coaches recommended water and 23% recommended sports drinks (8).

In this study, only 38.9% knew that sports drink was more effective than water. Approximately 72.2% of coaches identified other colleagues as a primary resource for information. With the deficit of knowledge identified, this is of concern as there is a possibility of inadequate knowledge of hydration being disseminated, thus perpetuating the problem. It is reassuring that other sources of information are being utilized with professional journals and professional organizations (48.9% and 58.9%, respectively), being cited as information sources by coaches (48.9% and 58.9%, respectively). Vigorous exercise results in decrease in plasma volume, and athletes often times do not drink enough water to match sweat losses. Without replenishment, fatigue occurs with decreased performance and mental alertness (12). This was recognized by most coaches in this study as in other studies (2, 8, 10). The early recognition of the hydration needs is important as a reduction of 1%–3% in body weight from exercise-induced sweating is sufficient to diminish an athlete's endurance and performance and can potentially result in disruption in physiological function (13). The earliest detection of impending dehydration was not well known among Jamaican coaches. Most (78.9%) relied on thirst as an early indicator.

The coaches gave vague advice to their athletes about fluid replacement *just keep sipping water*, while one participant stated that advice was given against drinking during competition *this will have a negative impact on the athletes and their performance*. Few coaches related dehydration with the state of climate: *if the time is hot, drink fluid to prevent dehydration*. These coaches were seemingly unaware that the athlete may become dehydrated even in cold temperature.

Athletes drinking more water than their sweat losses will put them at risk for developing hyponatraemia due to excessive intake having knowledge on what type and amount of fluid needed for replacement or the benefits of water and sports drinks is important, but this seemed to be lacking. Some coaches (18.9%) were unaware of the concentration of carbohydrates in sports drinks which suggest that they were unaware of the optimal amount of fluid and carbohydrate concentration.

In our survey, there was no significant correlation between coaches' knowledge and formal training in exercise physiology as well as fluid replacement therapy. While Barr (19) found a significant correlation between the two variables, Juzwiak and Ancona-Lopez (8) found that although coaches might have adequate education, their nutritional knowledge will not necessary be greater, and also there was no correlation between knowledge of nutrition and years of experience (8).

Although the study found that most coaches (average 84.5%) are aware that performance is affected by dehydration, few (26.6%) seem to have adequate knowledge on prevention strategies. Erroneous information may be disseminated among the coaching staff and then later imparted to athletes. This deficit in knowledge is possibly due to the low number of coaches (28.9%) received formal training in fluid hydration. Coaches at all levels should be provided with adequate knowledge of nutrition which is not necessarily so in most cases as athletes are often times misinformed (20, 21).

Sports team support staff which include coaches and athletic trainers are seen as primary source of information by their athletes in providing nutritional guidance (8). Torres-McGehee *et al* (22) showed that 64.1% of coaches had inadequate nutritional knowledge, whereas a mere 35.9% had adequate knowledge; however, 61% of coaches demonstrated knowledge on hydration (22). Studies by Corley *et al* (23) and Smith-Rockwell *et al* (20) had similar findings. This survey indicated similar findings with inadequacies in knowledge base of coaches; less than half (38.9%) of coaches knew that water was not as effective as a sports drink containing carbohydrates and electrolytes; as much as 58.9% of coaches incorrectly thought that 150% fluid replacement was needed post exercise; most coaches were unsure what type of carbohydrate should be in sports drinks with about a third (38.9%) agreeing with fructose, mainly another third (36.7%) disagreeing and the rest being unsure.

The study found that all participants (100%) stated that they give their athletes information about fluid replacement, although they did not give specifics on amounts of fluid that should be consumed; they told the athletes that generally they needed to drink and remain hydrated to ensure the best performance. Coaches gave suggestions on the ways to improve rehydration practices of coaches, which include seminars, on-site workshops and more frequent workshops held throughout the year. A few said that brochures should be disseminated at events and in schools.

CONCLUSION AND RECOMMENDATIONS

The study results would indicate that knowledge on what type and amount of fluid needed for replacement or the benefits of water and sports drinks seemed to be inadequate, and there is a need to ensure that all Jamaican coaches are adequately trained in fluid replacement therapy as they are the main educators of other coaches and athletes. Also that medical staff working at sporting events also be trained in fluid replacement therapy.

Attendance at formal conferences on fluid replacement, dehydration and heat-related injuries should be a requirement for all coaches and medical staff wishing to work at sporting events. Brochures with fluid and carbohydrate replacement information could also be distributed at these events as the study indicates that 58.9% of coaches retrieve their information this way. Promotion strategies focusing on the main points such as when to use what type of fluid, how much fluid and how fast fluid needs to be replaced need to be a highlighted during those events.

Coaches and athletes should be educated on how to estimate hydration using urine colour and weight pre- and post-training or competition. On-site educational promotion at events would also be a good tool to disseminate the above information. The services provided by professional organizations such as NATA need to be more utilized by coaches as they monitor, improve and change guidelines according to new data or research.

Further research needs to be done after implementing workshops, conferences and promotions on fluid replacement and hydration to evaluate improvement, if any, in Jamaican coaches' knowledge on fluid rehydration and replacement.

A survey related to the current study topic should also be done to garner the knowledge and attitude of medical staff working at sporting events as many are not trained in the field of sports medicine (in Jamaica) and coaches (67.8%) identified them as a source of information.

Limitations

The findings of the study are interpreted in light of potential limitations which include the following:

Because the survey was done through an interviewer-based questionnaire, some participants would have provided socially desirable responses.

The small study numbers could also have a limited ability to detect associations that are small and moderate in magnitude.

Education level may have an impact on whether the coach having a diploma, bachelors, masters, or none of the above may significantly impact the score, although in a previous study this was not shown to be applicable (8).

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