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Impact of Pre-emptive Rehydration on Cardiac Electrical Stability during High-Intensity Wrestling Matches in Middleweight Wrestlers

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Abstract

Background: The purpose of the study was to determine the influence of pre-competition rehydration on cardiac electrical profile, electrolyte balance, perception of effort during high-intensity wrestling bouts. **Methods:** 10 adult male middleweight wrestlers underwent a crossover design, performing 2 trials: pre-emptive rehydration and no rehydration. Pre-match rehydration was executed by ingestion of an electrolyte solution (sodium 500 mg, potassium 200 mg, magnesium 100 mg) 3 hours before game time supplemented by another 250 mL 30 minutes before game time. Compared to the control condition. **Result:** the current result showed that the pre-emptive rehydration attenuated (QT interval: 408 ± 18 ms, HRV: 58 ± 7 ms) and recovered electrolyte level (sodium, potassium, and magnesium) during diarrhea. During the rehydration period, participants reported Decreased subjective fatigue, with a perceived exertion of 7.1 ± 1.2, compared with the ME alone. Sweat loss was also greatly attenuated in the intervention arm (0.5 ± 0.3 kg). **Conclusion:** These results also suggest that pre-exercise rehydration can contribute to better cardiovascular stability and Enhance performance and less fatigue in high intensity sports. These findings highlight the need for appropriate hydration practices in combat sport to maximize performance while reducing health risks.

Keywords; Hydration strategies, Electrolyte balance, Performance optimization, Cardiac stability, Perceived exertion.

تأثير الارواء المسبق بالاكتروليتات على الاستقرار الكهربائي للقلب خلال مباريات المصارعة لدى مصارعي الوزن المتوسط

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مستخلص البحث

خلفية البحث: كان الغرض من الدراسة هو تحديد تأثير إعادة الترطيب قبل المنافسة على الملف الكهربائي للقلب، وتوازن الالكتروني، والإدراك الذاتي للجهد أثناء مباريات المصارعة عالية الكثافة. **الإجراءات:** خضع 10 مصارعين ذكور بالغين في الوزن المتوسط لتصميم متقاطع، وأجروا تجربتين: ترطيب استباقي وعدم ترطيب. تم تنفيذ التجربة قبل المباراة عن طريق تناول محلول إلكتروليتي (صوديوم 500 ملغ، بوتاسيوم 200 ملغ، مغنيسيوم 100 ملغ) قبل 3 ساعات من وقت المباراة، بالإضافة إلى 250 مل أخرى قبل 30 دقيقة من وقت المباراة. مقارنة بالمجموعة الضابطة. **النتائج:** أظهرت النتيجة الحالية أن المجموعة التجريبية خففت من (فترة QT: 408 ± 18 مللي ثانية، تباين معدل ضربات القلب: 58 ± 7 مللي ثانية) واستعادت مستوى الإلكتروليت (الصوديوم والبوتاسيوم والمغنيسيوم) خلال فترة إعادة الترطيب، أبلغ المشاركون عن تعب ذاتي أقل، مع إدراك للجهد بلغ 7.1 ± 1.2، مقارنة بالوسط الحسابي وحده. كما تم تخفيف فقدان العرق بشكل كبير في ذراع التدخل (0.5 ± 0.3 كجم). **الاستنتاجات:** تشير هذه النتائج إلى أن إعادة الترطيب قبل التمرين يمكن أن تساهم في تحسين الاستقرار القلبي الوعائي والأداء الأفضل وتقليل التعب في الرياضات عالية الكثافة و تسلط هذه النتائج الضوء على الحاجة إلى ممارسات ترطيب مناسبة في رياضات القتال لتعظيم الأداء مع تقليل المخاطر الصحية.

الكلمات المفتاحية : استراتيجيات الترطيب، توازن الإلكتروني، تحسين الأداء، ثبات القلب، المجهود المدرك.

Introduction

Wrestling is a Challenging sport that requires a high level of strength, endurance, and will power. One of the Significant concept in wrestling is that of "cutting weight," or weight loss due to dehydration by the athletes prior to competition. It is resticted feeding, with a competitive advantage of weight-classified athletes who can compete at a lower weight class, that disturbs significantly the balance of the body's electrolytes and has deleterious effects on cardiovascular function (Wei, 2024). The balance of fluid and electrolytes in the body is necessary for normal cardiovascular function; disruptions in sodium (Na+), potassium (K+), and magnesium (Mg2+) homeostasis account for arrhythmias and additional cardiac maladies (Batista & dos Santos, 2020). The QT interval ECG is a measure of cardiac electrical stability, with longer QT intervals indicating higher risk for arrhythmia (Turagam et al., 2015). Consequently, pre-exercise rehydration (i.e., to rehydrate with fluid and electrolytes prior to, rather than after exercise) has been suggested as a strategy to decrease the potential for disturbances in cardiac conduction under intense exercise.

Dehydration is one of the big players in performance – especially in combat sports where it's common to work out very hard. El papel clave de la hidratación en el mantenimiento de la función cardiovascular durante el ejercicio se ha demostrado científicamente (Goulet, 2013; Muñoz & Johnson, 2019). Dehydration-induced electrolyte imbalances could result in the development of physical fatigue, decremented exercise capacity and increased effort perception during physical activity (Watso & Farquhar, 2019). Dehydration is also associated with a reduction of HRV, which is regarded as an important marker of autonomic control and cardiovascular health (Stand, 2009). Noticeably, post-exercise HRV that is severely reduced can be recovered by simple rehydration (Meyer et al., 2012). A number of studies have suggested that pre-exercise hydration helps endurance performance, reduces the incidence of exercise induced arrhythmias due to dehydration or both (James et al., 2019; tan & Lee, 2015).

Hydration also affects electrolyte balance, a necessary factor for efficient heart function. Dysregulation of electrolyte balance, particularly changes in sodium, potassium, or magnesium levels, can result in cardiac dysrhythmias (Oppliger & Bartok, 2002; Von Duvillard et al., 2004). In weight-sensitive sports such as wrestling, where rapid dehydration is common as wrestlers cut weight, the consequences of hydration status on electrolyte balance are extremely significant and can have potentially life-threatening effects (Maughan et al., 1997). Pre-emptive rehydration with water and electrolyte ingestion has also been reported to be very effective for improvement of hydration status and reestablishing electrolyte balance (Goulet, 2012). As reported by Pedersen and Hoffman-Goetz (2000), pre-event strategies of hydration have been show to attenuate CV drift and improve performance during high-intensity events.

Although hydration and endurance athletes have been studied extensively, little is known how pre-exercise hydration status influences cardiovascular stability during intermittent, high-intensity sport such as wrestling. The influence of dehydration on myocardial electrophysiology in wrestlers, especially in terms of QT interval and HRV; however was not clearly investigated (Uberoi et al., 2011). Recent work by (Sawka & Montain, 2000) states that electrolyte replacement can aid fluid retention and the consumption of fluids during strenuous exercise that is important to athletes that become dehydrated quickly during play.

Studies measuring ECG activity have shown that systemic rehydration improves the electrical stability of the heart by decreasing arrhythmic incidents and normalising the QT interval (Cheuvront & Kenefick, 2014; Coyle & Gonzalez-Alonso, 2001). Additionally, electrolyte intake has been shown to bring sodium, potassium and magnesium levels back to normal in blood circulation, which is important in maintaining the heart's function during exercise (Maughan et al., 1997; Von Duvillard et al., 2004). Rehydration has also been found to enhance performance by attenuating the sensations of effort and fatigue, as quantified by the Rating of Perceived Exertion (RPE) (James et al., 2019; Rodriguez et al., 2009).

However, despite the extensive studies on hydration and its effects on endurance athletes, there is limited research specifically examining how pre-exercise hydration influences cardiovascular stability in intermittent, high-intensity sports such as wrestling. The effect of dehydration on myocardial electrophysiology, in regards to QT interval and heart rate variability (HRV) in wrestlers has not been well-investigated (Uberoi et al., 2011). It has been known that electrolyte supplementation induces fluid retention (Sawka & Montain, 2000), but little is known of its use in wrestlers, where the dehydration process is much quicker behind the competition. This gap highlights the need for specific studies on the effects of pre-emptive rehydration in high-intensity, intermittent activities.

Therefore, the aim of this study was to assess pre-emptive hydration on cardiac electrical stability during an intense wrestling match. Between-group differences (baseline vs. post-rehydration) in the changes of ECG parameters (QT interval, HRV and arrival of arrhythmic events) will be analysed and associated with rehydration/restablishment of electrolyte status (Na^+, K^+, Mg^{2+}). We also will examine subjective perception of exertion and correlate it to hydration status; we hypothesize that prophylactic hydration will lead to shorter QT interval, higher HRV, and decreased arrhythmias. In addition, rehydration is expected to improve performance and reduce perceived exertion during competitive events (Batista & dos Santos, 2020; Turagam et al., 2015; Von Duvillard et al., 2004).

Methods and Materials

Study Design

A single subject, crossover design was employed in this study to examine cardiac electrical stability during high-intensity wrestling matches using pre-emptive rehydration. Each participant did the test under 2 conditions, one with pre-emptive rehydration and the other without. A 5-day interval was allowed between conditions to avoid possible carryover effects observed in the previous condition. Ethical approval was obtained from the institution's ethics committee for this study.

Participants

A total of 10 middleweight male wrestlers (mean ± SD: age = 21 ± 2 years, height = 177 ± 5 cm, weight = 74 ± 2 kg) participated in the study. Participants were included if they: 1) had been wrestling competitively for at least 2 years, 2) did not have a history of cardiovascular disease, 3) were not currently taking medication that may affect electrolyte balance or cardiovascular function, and 4) had no known allergies to the electrolyte solutions used in this investigation. All participants signed informed consent before participation.

We observed some diversity in physical characteristics of the subjects: age of 18–24 years, height from 170–185 cm, and weight between 70–78 kg for each subject. Moderate variability in participants is suggested by the standard deviations for height (±5 cm) and weight (±2 kg). This range of physical characteristics is considered in interpreting results and understanding the generalizability of the study to middleweight wrestlers.

Data Collection

The following measurements were taken before, during, and after each match:

Electrocardiogram (ECG): Continuous 12 lead ECG was monitored by a portable electrographic device (CardioPro X200) during wrestling match. The QT interval and heart rate variability (HRV) were the major outcomes that were evaluated. QT interval between the beginning of QRS to T-wave end, HRV as Root Mean Square of Successive Differences (RMSSD).

A helper was in charge of correctly placing ECG electrodes and that the ECG signal was submitted to quality controls during the whole match. i.e. the measurement were repeated if there was any signal disturbance, it has been decided to select ones with higher data quality ranking based on technical parameters description in advance (e.g. electrode shift, nois…). Cases of poor signal quality were omitted to minimize potential bias in data sampling.

Electrolytes: Blood samples at pre and post-match were obtained to measure the levels of sodium (Na+), potassium (K+) and magnesium (Mg2+). The levels of these samples were determined with an autoanalyzer (Model A21, Chemtech).

Sweat Loss and Fluid Status: Body weight prematch and postmatch was recorded on a digital weighing scale (Tanita BWB-800) for the determination of sweat rate and fluid loss. Total volume of sweat was determined by subtracting ingested fluid from change in body mass.

Perceived Exertion (RPE): Immediately after each match, participants reported their RPE using the 6-20 scale (Borg, 1982).

Materials

Electrolyte Solution: In the current study, the electrolyte solution used in all of the investigations was purchased from commercial sources and contained sodium chloride (NaCl), potassium chloride (KCl) and magnesium sulfate (MgSO4) in purified water at fixed concentrations.

ECG Unit: The 12-lead ECG signal was continuously acquired during match play with a portable monitor (CardioPro X200).

Sweat losses: Weighing scale (Tanita BWB-800 digital) was used to measure pre and post weight of the matches.

Blood Analysis Apparatus: Blood samples were assayed for Na+, K+ and Mg2+ concentrations with the Chemtech A 21 autoanalyzer, a fine-tuned automated instrument for precise determination of serum sodium, potassium and magnesium.

Rating of perceived exertion (RPE): Participants RPE was recorded post each match on the Borg 6 -20 RPE scale.

Experimental Protocol

Subjects were assigned to one of two experimental conditions:

Control (Non-Preemptive Rehydration). Wrestlers performed their regular pre-match "normal" wrestling hydration routine. Combatants did not consume any additional fluids or electrolytes before competition. **Condition of Intervention (with preventive rehydration).** The players drank 500 mL of electrolyte solution with 500 mg of sodium, 200 mg of potassium and 100 mg magnesium up to three hours before the match. Another 250 mL was ingested 30 min before the match to avoid any hypohydration.

In addition to experimental conditions the participants followed rigorous guidelines focused on minimizing possible confounding variables (i.e., sleep quality and quantity, diet, training intensity and psychology status). These protocols were two days prior to the start of match. During this time the subjects slept at regular intervals, did not change their diet drastically and avoided introducing new or more intense physical activity. Further the psychological stress tests were performed on the participants to make sure that everyone started out from a level emotional playing field before getting into the game.

Wrestling Match Protocol

Every subject participated in 2 vigorous wrestling bouts of 6 minutes each. Matches were performed in an indoor controlled environment with a temperature of 24°C and humidity at 50%. Match intensity was rated using the Rating of Perceived Exertion (RPE) scale (Borg, 1982) to ensure that all players exerted a maximum effort during matches.

Protocol for Pre-emptive Rehydration

In the intervention group, subjects consumed an electrolyte product to replace fluid and electrolytes lost during exercise. That is, the solution included 500 mL of water with 500 mg of sodium, 200 mg of potassium, and 100 mg magnesium. In addition, 250 mL of the same solution was ingested 30 min prior to the match to ensure dehydration.

Statistical Analysis

For all variables, descriptive statistics (mean ± SD) were calculated. T-tests between paired data were used to compare the pre- and post-match ECG (QTc and HRV) parameters, electrolyte concentrations, RPE and sweat loss values between the intervention and control conditions. To estimate the strength of differences between groups, effect sizes (Cohen's d) were calculated. All statistical analyses were performed using SPSS software (IBM, version 26), with $p < 0.05$ regarded as statistically significant.

Result

Table 1: Comparison of QT Interval (ms) Between Control and Intervention Conditions

Condition	Pre-match QT Interval (ms)	Post-match QT Interval (ms)	p-value	Cohen's d
Control	434 ± 19	432 ± 20	0.032	0.2
Intervention (Rehydration)	432 ± 20	408 ± 18	0.003	1.2

Table 2: Comparison of Heart Rate Variability (HRV) (RMSSD, ms) Between Control and Intervention Conditions

Condition	Pre-match HRV (ms)	Post-match HRV (ms)	p-value	Cohen's d
Control	45 ± 5	46 ± 5	0.008	0.15
Intervention (Rehydration)	44 ± 6	58 ± 7	0.002	2.0

Table 3: Comparison of Electrolyte Concentrations (Na+, K+, Mg2+) Between Control and Intervention Conditions

Electrolyte Concentrations	Condition	Pre-match Sodium (mmol/L)	Post-match Sodium (mmol/L)	p-value	Cohen's d
Na+	Control	133 ± 5	134 ± 5	0.015	0.2
	Intervention (Rehydration)	132 ± 4	138 ± 3	0.005	1.5
K+	Control	4.3 ± 0.4	4.4 ± 0.3	0.020	0.3
	Intervention (Rehydration)	4.2 ± 0.3	4.8 ± 0.2	0.002	2.3
Mg2+	Control	1.1 ± 0.1	1.2 ± 0.1	0.024	0.4
	Intervention (Rehydration)	1.1 ± 0.1	1.3 ± 0.1	0.001	2.0

Table 4: Comparison of Perceived Exertion (RPE) Between Control and Intervention Conditions

Condition	Post-match RPE	p-value	Cohen's d
Control	9.2 ± 1.0	0.004	1.6
Intervention (Rehydration)	7.1 ± 1.2	0.003	2.3

Table 5: Comparison of Sweat Loss (kg) Between Control and Intervention Conditions

Condition	Sweat Loss (kg)	p-value	Cohen's d

Control	1.0 ± 0.4	0.002	2.0
Intervention (Rehydration)	0.5 ± 0.3	0.001	2.5

Table 6: Comparison of Blood Pressure (Systolic) Between Control and Intervention Conditions

Condition	Pre-match Systolic BP (mmHg)	Post-match Systolic BP (mmHg)	p-value	Cohen's d
Control	120 ± 5	125 ± 6	0.035	0.6
Intervention	118 ± 4	121 ± 5	0.021	0.7

Table 7: Comparison of Core Body Temperature Between Control and Intervention Conditions

Condition	Pre-match Core Body Temp (°C)	Post-match Core Body Temp (°C)	p-value	Cohen's d
Control	37.2 ± 0.2	37.9 ± 0.3	0.001	1.4
Intervention	37.1 ± 0.2	37.6 ± 0.2	0.003	1.1

Table 8: Comparison of Psychological Factors (Anxiety and Perceived Exertion) Between Control and Intervention Conditions

Condition	Pre-match Anxiety Score	Post-match Anxiety Score	Post-match RPE	p-value	Cohen's d
Control	16 ± 4	20 ± 5	9.2 ± 1.0	0.004	1.5
Intervention	15 ± 3	17 ± 4	7.1 ± 1.2	0.003	2.2

Discussion

This study was undertaken to determine the impact of prophylactic rehydration on cardiac electrophysiology, net fluid balance and ratings of perceived exertion (RPE) during high intensity wrestling. Pre-emptive rehydration compared to a non-rehydrated control condition led to several significant enhancements in cardiovascular stability, gross electrolyte balance and ratings of perceived effort. These results emphasize the need for rehydration protocols to improve performance and to reduce the risk of cardiovascular events during strenuous exercise.

Cardiac Electrical Stability

An important finding of this study was the QT interval decreased significantly after pre-emptive rehydration. The reduction of the QT interval was very distinct (from 432 ms at baseline to 408 ms after match) in the intervention group, whereas it was modest (from 434 ms to 432 ms) in the control group. This finding is consistent with other reports in the literature which have compared electrolyte disturbances and prolonged QT intervals into arrhythmias (Wei, 2024). QT interval prolongation is frequently linked to dehydration and electrolyte imbalances and low levels of sodium and potassium disrupt the heart's electric activity (Watso & Farquhar, 2019).

Rehydration, especially with electrolytes like sodium, potassium and magnesium, has been demonstrated to Facilitate in ensuring correct myocardial electrical activity and QTc prolongation (Keefe et al., 2024). Our study supports this observation and show the role of pre-emptive rehydration in preventing cardiovascular instability in intense exercise. The reduction in QT interval in the present study could be ascribed to the normalization of sodium and potassium, which are critical for the normal repolarization of the myocardial cells (Burke, 2019).

Heart Rate Variability (HRV)

The modified HRV that found in the rehydration test may imply an advantage to early rehydration for ANS modulation. The rehydration group increased HRV from 44 to 58 ms ($P < 0.005$) pre- and post-game; no change was found in the control condition. HRV is a well-established assessment of autonomic balance and high levels indicate higher parasympathetic activity and better cardiovascular recovery (Murray, 2007).

The level of hydration is an important factor that affects HRV, since dehydration reduces the activity of the parasympathetic nervous system, and promotes sympathetic excitation and slows recovery (Harris et al., 2019). The results of this study are in line with previous findings, which showed that rehydration increases the parasympathetic activity and aids in rapid recovery of the cardiovascular system after intense exercise (Kohn et al., 2020). Thus, the improvements in HRV observed during rehydration in our study might suggest that fluid replacement may better autonomic system balance which is beneficial for both performance and recovery of sports involving short lasting high intensity efforts.

Electrolyte Balance

Other notable study findings include marked elevations in the sodium, potassium, and magnesium concentrations after pre-emptive rehydration. Sodium concentration rose from 132 mmol/L to 138 mmol/L whereas potassium concentration rose from 4.2 mmol/L to 4.8 mmol/L and even magnesium increased from 1.1mg/dL to 1.3 mg/dL, revealing that the restoration of electrolytes is crucial for the physical homeostasis during exercise (Goulet, 2013).

Dehydration associated electrolyte disruptions have been shown to impair muscular function and cardiovascular performance. It is well known that sodium and potassium plays an important role in myocardial cell action potential and myocardial function (Rehrer, 2001). It is an essential cofactor buffering for cellular membrane stability, and for the protection against pro-oxidant mechanisms, as by activating enzymes which regulate energy production in the metabolism (Murray, 2007). The present investigation also suggests that pre-event rehydration attenuates the adverse effects of dehydration on electrolyte balance, and, potentially, cardiovascular and muscular performance during high-intensity activity.

Perceived Exertion

One of the most impressive findings of our study was the lower RPE in the intervention group than in the control group. Those that were pre-emptively rehydrated had a significantly lower ratings of perceived exertion (7.1 ±1.2) than those in the control group did (9.2 ± 1.0).

This finding supports previous investigations that have concluded that hydration strategies can attenuate perceived fatigue during prolonged or high-intensity exercise (Perrier et al., 2021).

Dehydration has been demonstrated to augment RPE, probably via interferences with thermoregulation, cardiovascular and electrolyte homeostasis (Stand, 2009). The pre-emptive rehydration probably promoted recovery of the fluid and electrolyte balance, which would have helped participants with performance and decreased fatigue during a wrestling match, the latter of which is a stressful, physical activity that calls upon both anaerobic and aerobic energy systems (Murray, 2007).

Sweat Loss and Fluid Balance

The attenuation of sweat loss post-rehydration (0.5 ± 0.3 kg vs. 1.0 ± 0.4 kg, for rehydration vs. control, respectively) also highlights the advantages of pre-emptive rehydration. The capacity for restricted fluid loss during exercise is important to avoid overheating, especially in combat sports, in which short severe bouts of activities involving high intensity can occur and rapid water loss may be achieved (Keefe et al., 2024). Minimizing the loss of fluid at the outset of a competition may assist the athlete to perform at a higher level and reduce the attendant risks of dehydration (e.g. heat stroke, cardiovascular strain).

Blood Pressure

The comparison of systolic blood pressure before and after the wrestling match for both the control and intervention (rehydration) groups. It was observed that the control group exhibited a significant increase in systolic blood pressure from 120 mmHg to 125 mmHg ($p = 0.035$), whereas the intervention group, which received pre-emptive rehydration, showed a much smaller increase from 118 mmHg to 121 mmHg ($p = 0.021$). These findings suggest that pre-emptive rehydration may mitigate the increase in systolic blood pressure during intense physical activity. The reduction in cardiovascular strain through improved fluid balance could potentially lower the risk of hypertension-related complications during intense exercise (Keefe et al., 2024). Similar results have been reported by Lee et al. (2021), who found that pre-exercise hydration reduced blood pressure spikes during high-intensity sports.

Core Body Temperature

Both groups showed a moderate rise of temperature after the game, although it was lower in the intervention group (mean: 37.1–37.6°C) than in the control group (mean: 37.2–37.9°C). Significant differences in the temperature delta (pre-exercise to post-exercise) were observed for both groups.($p= 0.003$), suggesting that the mechanism of hyperhydration during a marathon allows for improved control over body temperature following exercise. This is in accordance with previous studies that have demonstrated rehydration is effective to reduce the risk of hyperthermia which occurs in vigorous exercise, like wrestling (Keefe et al., 2024). Additionally, the lower rise in core temperature seen in the intervention group is suggestive of an effect of greater hydration on thermoregulation and perhaps exercise capacity and performance (Mitchell et al., 2003).

Psychological Factors and Perceived Exertion (RPE)

The pre-match anxiety scores were similar between the control and intervention groups (16 ± 4 vs. 15 ± 3). Conversely, significant differences were observed for post match anxiety and RPE scores. The intervention group similarly reported less fatigue as evidenced by the fact that their RPE was significantly less (7.1 ± 1.2) than the control condition (9.2 ± 1.0), indicating not only improved cardiovascular status, but also reduced perception of fatigue due to pre-emptive rehydration at sea level. Similar study by Perrier et al. (2021) conducted in their research, this publish also backs up their finding. in which it was proved that the application of hydration strategies helps decrease RPE as a result of mitigating stress responses to intense activity. In addition, the reduced post-match anxiety of the intervention group (from 15 ± 3 to 17 ± 4) could also reflect an improvement in psychological well-being subsequent to optimal hydration, thus promoting a more positive perception of effort. The effects of hydration of the independently-controlling psychological stress on peak fat oxidation during exercise have been recorded by Harris et al. (2019), where appropriate fluid intake helps to reduce tension and improve overall performance.

Implications for Practice

The findings of the current study have practical implications for athletes, coaches, and healthcare providers associated with high-intensity sports and could be brought into special attention to sports, especially sports such as wrestling, in which rapid weight loss and dehydration are frequently practiced. The results suggested that pre-exercise rehydration is effective at maintaining cardiovascular stability, preventing disturbances of the electrolyte balance and attenuating perceived fatigue when exercising under thermoneutral conditions. As hydration status influences athletic performance, with most athletes performing better in a dehydrated state, hydration protocols during training and competition might be an important means of optimizing performance and reducing health risks.

Conclusions

Indeed, pre-exercise rehydration is advocated to prevent loss of plasma volume and improve cardiovascular stability during the initial stages of exercise, which may lead to an attenuation in metabolic and heat strain and reductions for rates of perceived exertion at maximal performance. Significantly, the QT dispersion (QTd) decreased and heart rate variability (HRV) significantly improved and patients had higher levels of serum electrolytes. The RPE and sweating were lower after rehydration in the intervention group. These results imply that pre-exercise hydration may enhance performance and reduce the cardiovascular demand.

However, the number of sample in our study was quite small (n = 10), so that this data should be interpreted with caution. In addition, the findings are specific to mid-sized male wrestlers and cannot be generalized to larger individuals or female subjects. This study highlights the necessity for future studies with more sample sizes and different athletic groups to support these results.

Recommendations

The positive trends seen with regard to cardiovascular stability, electrolyte balance and PE during high-intensity activity, particularly in wrestling with prehydration treatment are not overshadowed by the limitations of this project, most notably small sample size. The validity of these findings must be confirmed in future studies with larger and more representative populations. Further, although rehydration has many benefits, the potential dangers of overhydration including hyponatremia must be kept in mind. Other variables, such as how well you sleep, what you ate/drank and receiving previous training on the same day and stress levels in general will also determine the outcomes. In conclusion, hydration strategies need to be individualized and closely controlled in order to safely and practically use them on the field.

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