



The Effect of Wet Cupping Therapy on Recovery in Athletes

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ABSTRACT

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The purpose of this study is to evaluate the effects of wet cupping therapy (WCT) on post-exercise recovery in active athletes. A total of 11 healthy and active athletes, with a mean age of 21.4 ± 1.77 years, an average height of 1.77 ± 0.1 m, a mean body weight of 75.4 ± 5.65 kg, and an average training experience of 10.6 ± 2.35 years, voluntarily participated in the study. Initially, the participants' resting heart rate and blood lactate levels were measured, followed by the Yoyo-1 test conducted until exhaustion. During the first measurement, heart rate and blood lactate levels were recorded post-exercise recovery at 3, 6, 9, 12, 15, 20, and 30 minutes. In the second measurement, the same test protocol was applied; however, this time, WCT was administered post-exercise recovery, and the same measurements were repeated at identical intervals. The data were analyzed using SPSS 26.0, and groups were compared using the Paired-Samples T-Test, with a significance level set at $p < 0.05$. The results indicated that WCT had a significant effect on reducing blood lactate levels and heart rate after exercise. These findings suggest that WCT may be an effective method for enhancing recovery.

INTRODUCTION

In the modern sports world, the need for effective recovery methods to enable athletes to perform at their highest level during intense training and competitions is increasing. Although various strategies have been developed to manage athletes' recovery processes, there is still no consensus on the effectiveness of these strategies and which methods are more

efficient (Kiloatar et al., 2024; Mihajlovic et al., 2023; Querido et al., 2022). Several studies in the literature focus on recovery processes in athletes, with most emphasizing the positive effects of active recovery (AR) methods on recovery (Afonso et al., 2021; Karavelioğlu et al., 2021; Karavelioğlu et al., 2024; Van Hooren & Peake, 2018). Additionally, methods such as massage (Davis et al., 2020; Kaesaman & Eungpinichpong, 2019), foam rolling (Wiewelhove et al., 2019), hydration (Harris et al., 2019; Orrù et al., 2018), sleep (Fullagar et al., 2015), nutrition (Calleja-Gonzalez et al., 2020), and cold-water immersion (Delextrat et al., 2013; Pelana et al., 2020) have also been observed to support recovery in athletes. However, there are no studies in the literature on the impact of WCT on athletes' recovery processes.

WCT has been reported in the literature to have various benefits, such as increasing circulation, relieving pain, reducing inflammation, and accelerating the removal of toxins from the body (Abdelfattah et al., 2024; Ekrami et al., 2021; Irandoust et al., 2022; Umar et al., 2018). Additionally, some studies have suggested that WCT has the potential to improve performance indicators (Dergaa et al., 2023; Karavelioğlu et al., 2019). It is also known that wet cupping has acute effects (Cao et al., 2014). However, there is insufficient scientific evidence regarding its effects on physiological recovery in the context of sports science. Therefore, comparing the effects of WCT on recovery with those of AR will help athletes make more informed decisions about their recovery methods and provide coaches and sports scientists with a valuable scientific foundation for developing more effective recovery strategies. Physiological parameters such as heart rate (HR) and blood lactate level (LA) are frequently used in the evaluation of the recovery process after exercise. While heart rate reflects the response of the cardiovascular system to exercise and the level of recovery via the autonomic nervous system, blood lactate level shows the rate of removal of metabolic byproducts accumulated during exercise and the body's metabolic recovery capacity (Ahmaidi et al., 1996; Coates et al. 2014; Plews et al., 2025).

This study aims to fill this gap in the literature by examining the effects of WCT on post-exercise recovery and offering a new alternative to enhance athletes' performance recovery processes.

METHODS

Participants

The G*Power (3.0.8) program was used to determine the required sample size. According to the power analysis, the type I error amount (alpha) was 0.05, the power of the

test (1-beta) was 0.8, the study power was 0.83, and the sample size was 27. However, 11 participants who did not want to complete the study and 5 participants who withdrew from wet cupping at the last minute were excluded from the study. The study was completed with a total of 11 healthy and active athletes with an average age of 21.4 ± 1.77 years, an average height of 1.77 ± 0.1 m, an average body weight of 75.4 ± 5.65 kg, and an average training experience of 10.6 ± 2.35 years. The participants were selected based on their regular exercise background and their ability to complete the study protocol. During the selection process, criteria such as the absence of any acute or chronic medical history, no recent injuries, and no cardiovascular health risks were considered. Exclusion criteria included smoking, regular medication use, and any physical or health issues that could prevent participation in the study. No serious adverse events were reported during the study. Except for temporary skin sensitivity and mild bruising associated with the wet cupping therapy, participants did not exhibit any physiological or clinical adverse responses to the intervention protocols.

Table 1.
CONSORT Flow Diagram

Participants Assessed for Eligibility	27 male athletes were assessed.
Excluded	• Did not complete the first Yoyo-1 test: 9 • Did not complete the second measurement: 2 • Refused wet cupping therapy: 5
Included in the Study	Total excluded: 16 11 male athletes were included.
Randomization	Single-group crossover design was used. Participants were randomly assigned to intervention order.
Intervention	A 48-hour washout period was applied. Participants received Active Recovery or Wet Cupping Therapy in a randomized sequence.
Power Analysis	Power = 0.80; $\alpha = 0.05$; Effect size (d) = 0.5 Required sample size: 18 participants 20 were initially recruited, considering possible dropouts.
Statistical Analysis	Normality: Shapiro-Wilk Test Comparisons: Paired-Sample T-Test

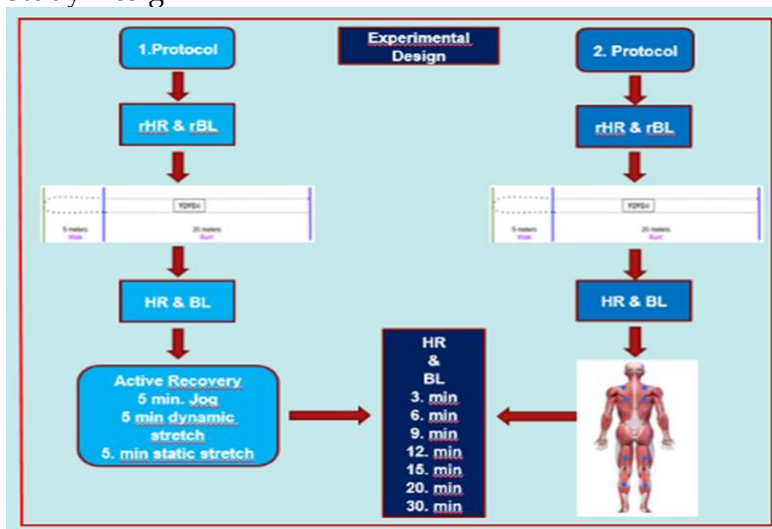
Study Design

This partial study was conducted with a single-group crossover design (crossover) model. The research protocol was approved by the Dumlupınar University Clinical Research Ethics Committee (Decision No: 10, Date: 25/03/2021) and the necessary permissions were obtained from the Ministry of Health of the Republic of Turkey (Date: 05.05.2021, Number: 11103). The study is conducted following the principles of the Declaration of Helsinki. Participants were randomly assigned according to the order of interventions by the

randomization method. The randomization process was carried out by the computer-aided simple randomization method. Each living being included both active recovery and warm cup application conditions. A 48-hour washout period (washout period) was planned between the applications in order to reduce the transition rates between the interventions. In both test protocols, resting blood lactate level and heart rate were measured before exercise, and then the Yoyo-1 test was applied until exhaustion.

Blood lactate and heart rate measurements were made at the 3rd, 6th, 9th, 12th, 15th, 20th, and 30th minutes after the exercise. All protocols are arranged individually for the individuals. Yoyo-1 test applications were performed in groups of two, and they were not informed which recovery method (active recovery or wet cupping) would be applied after the exercise. This approach aimed to ensure blinding of the interruptions. Wet cupping applications were performed by a physician (Dr. Said Altıkat) as part of cupping therapy. Blood lactate movements and heart rate measurements in wet cupping records were taken by an independent auxiliary health personnel. Active recovery applications were carried out under the guidance of a trainer; during this time, blood lactate measurements were again performed by a different auxiliary health personnel. Due to the nature of the intervention types and the blinding of the interruptions could not be done. However, in order to ensure consistency of measurements, all blood lactate and heart rate measurements were performed by different people. In this way, measurement-related bias was minimized and data recording was aimed to be increased.

Figure 1.
Study Design



Height and Body Weight Measurements

The height of the participants was measured using a Holstein brand stadiometer with a precision of 0.01 cm, while body weight was measured using a scale with a precision of 0.01 kg.

Yoyo-1 Test

The Yoyo-1 test is an assessment tool used to measure physical endurance through progressively increasing shuttle runs. The participants run back and forth between two markers, each 20 meters apart, with a 5-meter AR zone where they perform walking or jogging for 10 seconds between each shuttle run. The speed of the runs is controlled by audio cues from a CD. The test ends when the participant fails to reach the starting line twice or when they reach exhaustion.

Wet Cupping Therapy

Cupping therapy was performed by one of the authors (SA), a certified physician from Atatürk University, Faculty of Medicine, trained in the Cupping Application Training Program. The therapy used sterile, single-use cups with a diameter of approximately 5 cm. The application was performed according to the following procedure on the points shown in

The researcher wears a plastic apron, sterile gloves, and a face mask.

The cupping point is cleaned with povidone-iodine/alcohol.

The wet cupping cup is placed on the target area, and suction is created using a manual pump until the skin is raised. The cup is left in place for 2 minutes.

The air valve on the cup is opened.

Using a lancet pen/razor, 15-20 small incisions, approximately 2 mm in depth, are made in the swollen area.

The cup is reapplied to the same area, and suction is created again with negative pressure.

Suction is maintained for 10 minutes, or until the flow of fluid stops.

The air valve on the cup is opened, and the cups are removed.

The cupping area is cleaned, and the blood is safely discarded.

Steps 6-9 are repeated three times.

Participants are given a 15-minute rest period during which they are allowed to eat.

After the 15-minute rest, participants are evaluated for signs of hypovolemia.

Participants are advised on infection signs and symptoms, and they are informed that they can contact the researchers if necessary.

Figure 2.
Cupping Application Points



Blood Lactate Measurements

Blood lactate levels were measured using blood samples collected from the participants' right middle fingertips with a lancet pen, following appropriate sterilization and hygiene protocols. The lactate levels were determined using the Lactate Scout brand portable lactate analyzer.

Heart Rate Measurements

Heart rate measurements were conducted using the Polar M430 GPS Heart Rate Monitor (Polar RC3, Finland). This device uses optical sensor technology for heart rate measurement. When worn on the wrist, the device works by detecting blood flow in the veins using the principle of light absorption. LED lights are emitted under the skin, and the reflected light is measured to determine the heart rate by detecting the movement of blood.

Statistical Analysis

The data obtained from the research were statistically analyzed using SPSS 26.0 software. The normality assumption of the data was tested using the Shapiro-Wilks test. Comparisons of the data were performed using the Paired-Sample T-test. Statistical significance was set at a level of $p < 0.05$.

RESULTS

It was observed that WCT is more effective than AR in reducing lactate levels at 6-, 9-, 12-, 15-, 20-, and 30-minutes post-exercise recovery ($p<0.05$). However, no statistically significant difference was found between WCT and AR in terms of their effects on resting, post-exercise recovery, and 3-minute lactate levels ($p>0.05$) (Table 2).

Table 2.

Comparison of Blood Lactate Levels between AR and WCT

	Active Recovery	Wet-Cupping Therapy	t	p
	Mean $\pm$ sd	Mean $\pm$ sd		
Rested BL (mmol/L)	1.69 $\pm$ 0.33	1.67 $\pm$ 0.22	-2.049	.885
Post-Exercise BL. (mmol/L)	13.56 $\pm$ 2.76	13.52 $\pm$ 1.60	.040	.969
3. min. BL. (mmol/L)	10.93 $\pm$ 2.09	9.75 $\pm$ 1.17	1.913	.085
6. min. BL. (mmol/L)	9.70 $\pm$ 1.89	5.53 $\pm$ 1.93	10.200	.000*
9. min. BL. (mmol/L)	7.20 $\pm$ 1.76	4.40 $\pm$ 1.98	6.580	.000*
12. min. BL. (mmol/L)	6.93 $\pm$ 2.44	3.60 $\pm$ 1.83	15.830	.000*
15. min. BL. (mmol/L)	6.72 $\pm$ 2.51	3.44 $\pm$ 1.97	17.950	.000*
20. min. BL. (mmol/L)	5.20 $\pm$ 2.19	3.06 $\pm$ 1.66	6.220	.000*
30. min. BL. (mmol/L)	5.05 $\pm$ 2.09	2.58 $\pm$ 1.23	5.090	.000*

* $p<0.05$

Table 3.

Comparison of Heart Rate Levels Between AR and WCT

	Active Recovery	Wet-Cupping Therapy	t	p
	Mean $\pm$ sd	Mean $\pm$ sd		
Rested HR (bpm)	67.18 $\pm$ 6.99	68.00 $\pm$ 6.30	-1.000	.341
Post-Exercise HR. (bpm)	162.36 $\pm$ 25.02	155.36 $\pm$ 28.87	.752	.469
3. min. HR (bpm)	115.36 $\pm$ 9.44	120.00 $\pm$ 7.93	-.535	.605
6. min. HR (bpm)	114.36 $\pm$ 6.54	120.45 $\pm$ 25.95	-.803	.441
9. min. HR (bpm)	110.63 $\pm$ 4.00	107.72 $\pm$ 6.75	1.911	.085
12. min. HR (bpm)	105.27 $\pm$ 7.04	107.27 $\pm$ 6.26	-1.506	.163
15. min. HR (bpm)	105.00 $\pm$ 6.97	102.81 $\pm$ 3.65	1.156	.274
20. min. HR (bpm)	100.63 $\pm$ 9.88	99.63 $\pm$ 3.52	.405	.694
30. min. HR (bpm)	101.45 $\pm$ 9.15	94.72 $\pm$ 2.37	2.331	.042*

* $p<0.05$

No statistically significant difference was observed between WCT and AR in their effects on heart rate reduction at rest, post-exercise recovery, or at 3-, 6-, 9-, 12-, 15-, and 20-minutes ($p>0.05$) (Table 2; Fig. 4). However, at the 30-minute mark of the recovery process, WCT was found to be more effective than AR in reducing heart rate ($p<0.05$) (Table 3).

DISCUSSION

The main findings of this study suggest that WCT is more effective than AR in reducing blood lactate levels in athletes following a load. However, in terms of heart rate, WCT was statistically more effective than AR only at the 30-minute recovery mark. These findings indicate that WCT could be considered an effective method in the recovery process, supporting the hypothesis of this study. Nevertheless, further research is required to increase the generalizability of these results and to evaluate them in a broader context.

A review of the literature reveals a consensus that AR methods are more effective than passive recovery in reducing heart rate and removing blood lactate levels. This finding is consistent with many studies indicating that active recovery, particularly following high-intensity exercise, accelerates the recovery process and has a positive impact on physiological parameters (Afonso et al., 2021; Davis et al., 2020; Karavelioğlu et al., 2024; Wiewelhove et al., 2019). Efforts to discover methods that enhance these positive effects are ongoing.

Musumeci (2016), in his study titled "Could Cupping Therapy Be Used to Improve Sports Performance?" emphasized that cupping therapy could improve physical performance in athletes and noted its widespread use among many famous athletes. Despite the frequent presence of athletes receiving WCT in media and social platforms, scientific studies on this topic remain limited.

In the literature, a study by Karavelioğlu et al. (2019) reported that WCT positively affects performance parameters such as 10-meter acceleration, vertical jump, and aerobic capacity in athletes. Similarly, Dergaa et al. (2023) concluded that this method could moderately enhance repeated sprint performance. Additionally, Abdelfattah et al. (2024) indicated that WCT has significant effects on athletes' hematological and immunological parameters and could be an effective method in reducing inflammatory responses caused by intense exercise. These findings were further supported by Ekrami et al. (2021), who stated that WCT is a practical approach in reducing post-exercise recovery inflammation. Studies on athletes have shown that WCT has positive effects on physical performance and recovery processes. Our study also concluded that WCT is an effective method for post-exercise recovery. In line with our study, Irandoust et al. (2022) found that cupping therapy positively effected heart rate recovery in handball players after the Wingate test. Similarly, Al-Bedah et al. (2018) reported that WCT stimulated the release of nitric oxide, which increased blood circulation. The negative pressure created by the cups activates small blood vessels under the

skin, improving microcirculation and aiding in the more effective removal of toxins and metabolic waste from the body (Umar et al., 2018). This mechanism may facilitate the faster metabolism and elimination of lactic acid.

In a study conducted on rock climbers, it was determined that athletes had lower blood lactate and heart rate in loads after active recovery (Valenzuela et al., 2015). It was stated that a higher heart rate during active recovery meant better lactate excretion (Draper et al., 2006). In a study conducted on swimmers by Sarı et al. (2016) and colleagues, it was determined that massage application was a better method than active recovery in the recovery process. In this study, blood lactate level was determined as 4.84 ± 1.51 and heart rate as 102.86 ± 13.42 at the 20th minute. In our study, blood lactate level was determined as 3.06 ± 1.66 and heart rate as 94.72 ± 2.37 at the 20th minute. Considering these results, it can be said that wet cupping application is an effective method in the recovery process.

Although the findings of this study are consistent with previous research conducted using similar methodologies and sample sizes, the limited number of participants is considered a major limitation. Despite the presence of comparable studies in the literature that employed small sample groups (Umar et al., 2018; Ekrami et al., 2021; Teut et al., 2012; King & Duffield, 2009), this limitation still affects the generalizability of the findings. Moreover, the study relied solely on physiological measurements, without collecting any data regarding participants' subjective perceptions (e.g., perceived fatigue or muscle soreness). In addition, the current research only focused on acute responses; therefore, the long-term effects of wet cupping therapy remain unexamined. Considering all these elements, the above-mentioned factors can be regarded as limitations of our study.

These findings support the potential effects of WCT on physiological recovery processes. However, to more comprehensively evaluate the physiological effects and contributions of WCT to sports performance, increasing the number of similar studies in this field is crucial.

CONCLUSION

In conclusion, WCT has been shown to have positive effects on blood lactate levels and heart rate recovery. These effects suggest that WCT can be an effective method in the recovery processes of athletes.

PRACTICAL IMPLICATIONS

Incorporating Wet Cupping Therapy (WCT) into structured recovery protocols may provide athletes and their support teams with physiological advantages that enhance performance readiness and mitigate fatigue-related declines. However, to maximize its effectiveness, WCT should be applied based on scientific evidence, tailored to individual needs, and integrated within comprehensive recovery strategies that encompass multiple modalities.

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Authors' Contribution

The first and second authors conceptualized and designed the study. The third author conducted the data analysis and interpretation. The first and third authors performed the literature search and contributed to writing the manuscript. The second author critically reviewed the study. All authors read and approved the final version

Declaration of Conflict Interest

No potential conflict of interest was reported by the authors.

Ethics Statement

The study was designed according to the Helsinki Declaration guidelines for human experimentation and received approval from the Istanbul Medipol University Clinical Research Ethics Committee (Decision No: 10, Date: 25/03/2021). Subsequently, permission for the study was obtained from the Ministry of Health (Date: 05.05.2021, Number: 11103).

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