International Journal of Health, Exercise, and Sport Sciences (IJOSS) ISSN: 3023-8382

RESEARCH ARTICLE / Araştırma Makalesi **Open Access/**Açık Erişim

Effect of Wet Cupping Application on Muscle Strength, Muscle Soreness and Sleep Quality in Athletes

Islak Kupa Uygulamasının Sporcularda Kas Gücü, Kas Ağrısı ve Uyku Kalitesi Üzerine Etkis,

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https://doi.org/10.5281/zenodo.16744249

Received / **Gönderim:** 15.04.2025

Accepted / **Kabul:** 20.06.2024

Published / **Yayın:** 30.06.2025

Volume 2, Issue 2, June, 2025

Abstract

One of the most common traditional and complementary medicine (TCM) methods among athletes is cupping application. The application performed by bleeding the skin is called wet cupping (hijama). One of the most importan parameters in athletic success is muscle strenght. Our aim is to investigate the effect of wet cupping application on muscle strength, muscle soreness and sleep quality. 14 volunteer men aged 20-24 were included in this study. After the necessary information was given to the volunteers, their written consent was obtained and they were checked for their fitness for exercise. Volunteers were divided into two groups: Cupping application group (CAG, n:7) and the control group (CG, n:7). Leg extension and leg felexion values of volunteers were measured for calculating one repitition maximum weight (1RM). All volunteers were rested during one week. For CAG group; after warm-up and stretching exercises, leg quadriceps muscle strength was measured with a dynamometer. Afterwards, leg extantion, leg flexion and squat exercises were performed as 10x3 set. One minute recovery was given between each of sets. After resting, the specialist and certified physician applied wet cupping on the back area of the subjects. After 30 minutes, the muscle test was repeated and VAS scores were recorded for quadriceps and hamstring. In addition, Richard Campbell's sleep quality test was applied. The muscle test and VAS scores were measured again after 24 hours, 48 hours and 72 hours. For CG group; the same tests and exercises were performed without applying wet cupping. After a month, the groups were crossed. The wet cupping was applied to the group that did not receive the cupping, and the tests were repeated in both groups. Thus, adaptation was prevented. Student-t test was used for comparisons between groups, and ANOVA test with repeated measures was used for within group comparisons. Our results showed that VAS values in CAG were significantly lower than CG. The sleep quality index was significantly higher in CAG than in CG. However, there was no statistically significant difference between the groups in terms of quadriceps muscle strength. According to these results, we can say that wet cupping application reduces muscle soreness, improves sleep quality, but does not increase muscle strength.

Keywords Wet cupping, hijama, muscle strength, muscle soreness, sleep quality.

Öz

Bu Sporcular arasında en yaygın geleneksel ve tamamlayıcı tıp (TCM) yöntemlerinden biri kupa uygulamasıdır. Deriyi kanatarak yapılan uygulamaya ıslak kupa (hacamat) denir. Atletik başarıda en önemli parametrelerden biri kas gücüdür. Amacımız ıslak kupa uygulamasının kas gücü, kas ağrısı ve uyku kalitesi üzerindeki etkisini araştırmaktır. Bu çalışmaya 20-24 yaş aralığında 14 gönüllü erkek dahil edildi. Gönüllülere gerekli bilgiler verildikten sonra yazılı onamları alındı ve egzersiz için uygunlukları kontrol edildi. Gönüllüler iki gruba ayrıldı: Kupa uygulama grubu (CAG, n:7) ve kontrol grubu (CG, n:7). Gönüllülerin bacak ekstansiyonu ve bacak fleksiyonu değerleri ölçülerek bir tekrarlama maksimum ağırlığı (1RM) hesaplandı. Tüm gönüllüler bir hafta dinlendirildi. CAG grubu için; ısınma ve germe egzersizlerinden sonra dinamometre ile bacak quadriceps kas gücü ölçüldü. Daha sonra bacak ekstansiyonu, bacak fleksiyonu ve squat egzersizleri 10x3 set olarak uygulandı. Her set arasında bir dakika dinlenme verildi. Dinlendikten sonra uzman ve sertifikalı hekim deneklerin sırt bölgesine ıslak kupa uyguladı. 30 dakika sonra kas testi tekrarlandı ve quadriceps ve hamstring için VAS skorları kaydedildi. Ayrıca Richard Campbell'ın uyku kalitesi testi uygulandı. Kas testi ve VAS skorları 24 saat, 48 saat ve 72 saat sonra tekrar ölçüldü. CG grubu için; ıslak kupa uygulanmadan aynı testler ve egzersizler yapıldı. Bir ay sonra gruplar çaprazlandı. Islak kupa uygulanmayan gruba ıslak kupa uygulandı ve testler her iki grupta tekrarlandı. Böylece adaptasyon önlendi. Gruplar arası karşılaştırmalarda Student-t testi, grup içi karşılaştırmalarda ise tekrarlı ölçümlü ANOVA testi kullanıldı. Sonuçlarımız CAG'deki VAS değerlerinin CG'den anlamlı derecede düşük olduğunu gösterdi. Uyku kalitesi endeksi CAG'de CG'den anlamlı derecede yüksekti. Ancak, quadriceps kas gücü açısından gruplar arasında istatistiksel olarak anlamlı bir fark yoktu. Bu sonuçlara göre, ıslak kupa uygulamasının kas ağrısını azalttığını, uyku kalitesini iyileştirdiğini, ancak kas gücünü artırmadığını söyleyebiliriz.

Anahtar Kelimeler Islak kupa, hacamat, kas gücü, kas ağrısı, uyku kalitesi

Introduction

One of the most common traditional and complementary medicine (TCM) methods among athletes is cupping application. Especially since champion athletes were practiced TCM, there is a question of whether these methods are related to performance. The history of the cupping application goes back to 3300 BC (Bridgett et al., 2018). Although there are many cupping application methods, currently the most used ones are dry cupping and wet cupping (hijama) methods (Aboushanab & Al Sanad, 2018). In dry cupping application, suction is applied to various areas of the skin without skin incision. In wet cupping application, epidermal incisions are made in the cupping application areas and blood and interstitial fluid are taken out of the body.

Cupping application is used in many diseases (Cao et al., 2010). It is suggested that cupping decreases muscle pains and accelerates regeneration, as a result, increases athletic performance (Bridgett et al., 2018). It is also claimed that by increasing local microcirculation, it accelerates the excretion of metabolic wastes and improve recovery (Arslan et al., 2015). It has been reported that cupping is particularly useful in reducing nonspecific neck pain (Lauche et al., 2012) and low back pain (Kim et al., 2011). It is also stated that cupping has beneficial effects to the immune system (Zeng & Wang, 2016) and increases the pain threshold (Emerich et al., 2014). It is stated that there is a decrease of microcirculation, hypoxia, lactate accumulation and metabolic acidosis in the region where dry cupping application and are observed secondary vasodilation and microcirculation increase (Emerich et al., 2014; Tham et al., 2006). In the wet cupping due to the incisions applied on the skin and blood, interstitial fluid and accompanying toxic substances accumulated in the subcutaneous region are taken out from body (al Jaouni et al., 2017).

There are many factors that affect athletic performance. Muscle strength is one of the most important of these parameters (Suchomel et al., 2016). After an unusual exercise, edema, myofibrillary damage and leucocyte infiltration occur in the muscles (Clarkson PM, 1999). This condition is defined as exercise-related delayed onset muscle soreness (DOMS) (Jack H Wilmore, W Larry Kenny, 2012). After unusual exercise, it peaks in 48-72 hours and then decreases (Akkurt et al., 2015; Saka et al., 2009). Muscle damage and muscle soreness decrease athletic performance via reducing range of motion and reducing muscle strength (Eston et al., 2004).

Sleep quality is one of the important parameters affecting athletic performance (Watson, 2017). Regeneration processes accelerate during sleep (Watson, 2017; Çakır & Erbaş, 201; Kurt et al., 2010). When sleep quality is poor, performance decreases (Eiffer, 2018).

We hypothesized that wet cupping application will decrease muscle soreness and will improve sleep quality and subsequently increase muscle strength. Our aim in the present study is to investigate the effect of cupping application on muscle strength, muscle soreness and sleep quality.

Material and Methods

Research Model

14 men aged between 20-24 years, volunteered to participate in the study. Those who do regularly mean 60 minutes aerobic exercise two day per week were included in the study. Among the suitability of the exercise, it was examined from the health check in the Sports Medicine Outpatient Clinic. Patients who has diabetes, hypertension, kidney disease, heart disease, bleeding diathesis, alcohol, smoking, drug use and those who cannot adapt to exercise were excluded. The necessary information was given about the study and written consents of the volunteers were obtained.

Volunteers were divided into two groups; cupping application group (CAG) and the control group (CG). Firstly, were measured the height and weight of the volunteers. After that, leg extension and leg felexion values of volunteers were measured for calculating one repitition maximum weight (1RM). Following measurement all volunteers were rested during one week.

All tests and applications were performed between 10:00-12:00 in the morning after 2 hours of fasting and one day without a protein-free diet. For CAG group; after warm-up and stretching exercises, quadriceps muscle strengths were measured with the dynamometer (Takei, Japan) with the backup right, the soles of the feet parallel to the ground, and the knee at 90 degrees of flexion. The measurements were repeated three time and best value was recorded. Afterwards, leg extantion, leg flexion and squat exercises were performed as 10x3 set at RM90%. One minute rest intervals were given between the sets. After 15 minutes of rest, they took a warm shower and wet cupping was applied. 6 cups with 6 cm diameter were applied by a specialist and a certified physician in the upper back area. Cups were placed on the right and left of the T1 spinous process, C7 spinous process, kahil point, on the right and left of the T10 spinous process and they were vacuumed. One minute after the cup application, the cups were removed and small epidermal incisions were performed with a scalpel. The cups were placed in their places and vacuum was applied. After waiting for 10 minutes, the cups were removed and cleaned with antiseptic solution and closed for 30 minutes with a clean sponge. The quadriceps muscle strength was measured again 30 minutes after the cup application. VAS scores were recorded for quadriceps and hamstring.

Richard Campbell sleep scale test were applied on the day of the test and exercise for both groups (Karaman Özlü & Özer, 2015). For all volunteers, quadriceps muscle strength measurement was repeated and VAS scores were recorded after 24 hours, 48 hours and 72 hours. For CG group; the same tests and exercises were performed without cupping application. Volunteers were prevented to do sports during three days. After one-month, the groups were crossed. The wet cupping was applied to the group that did not receive the cupping, and the tests were repeated in both groups. Thus, adaptation was prevented.

Analysis of Data

Data analysis were performed in SPSS 22.0 version program. Descriptive statistics mean, standard deviation, maximum and minimum values were taken. Paired t test was used for the comparison of the groups. For the comparison of the within group repeated measure ANOVA test was applied. Statistical significance level was accepted as $p<0.05$.

Results

When quadriceps VAS scores were evaluated, CAG's VAS scores are statistically significant difference lower than CG's VAS scores at all time periods. When evaluated within the group, there is a statistically significant difference between 24th hour and post exercise, 72nd hour. Moreover, there is a statistically significant difference between 48th and post exercise, 72nd hour ($p<0.05$), (Figure 1). Likewise, when hamstring VAS scores were evaluated, CAG's VAS scores are statistically significant difference lower than CG's VAS scores at all time periods ($p<0.05$), (Figure 2). In addition, there is a statistically significant difference between 24th hour and post exercise, 48th hour, 72nd hour. Moreover, there is a statistically significant difference between 48th and 72nd hour ($p<0.05$), (Figure 2).

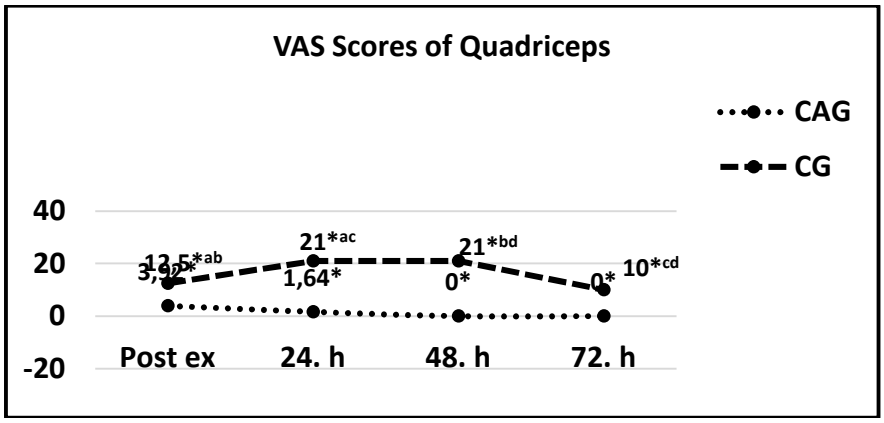

Figure 1. VAS Scores of Quadriceps

*There is a statistically significant difference between groups ($p<0.05$)
[abcd]The same letters show statistically significant differences within group

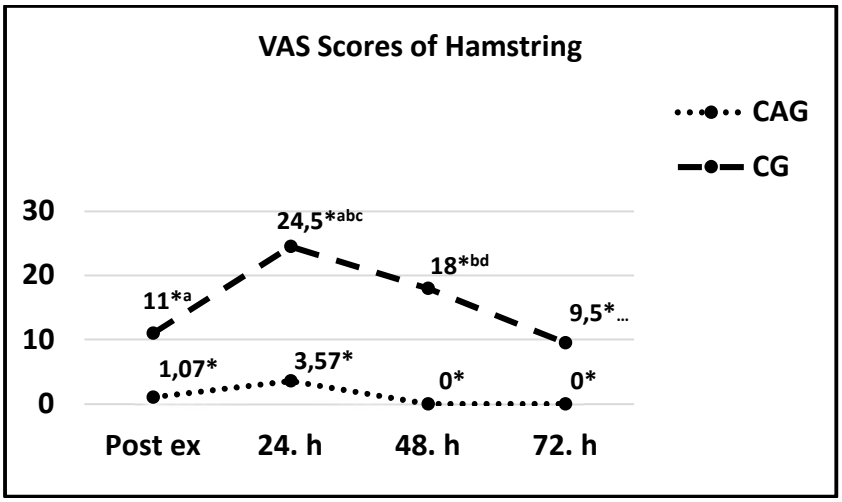

Figure 2. VAS Scores of Hamstring

*There is a statistically significant difference between groups ($p<0.05$)
[abcd]The same letters show statistically significant differences within group

When muscle strength was evaluated, there is no difference both within groups and among groups (Figure 3).

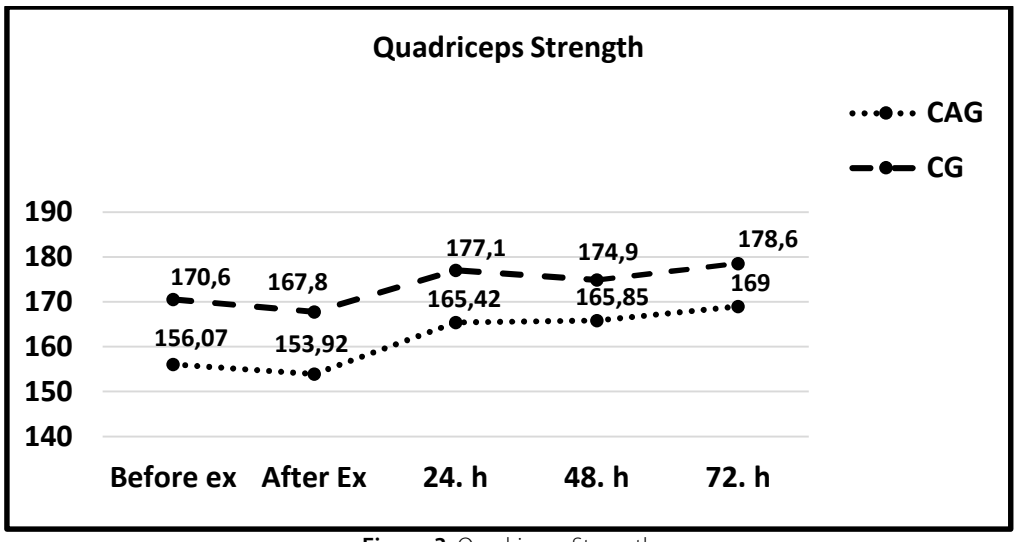

Figure 3. Quadriceps Strength

When sleep quality was evaluated, Sleep Quality Index is statistically significantly higher CAG versus CG (Figure 4).

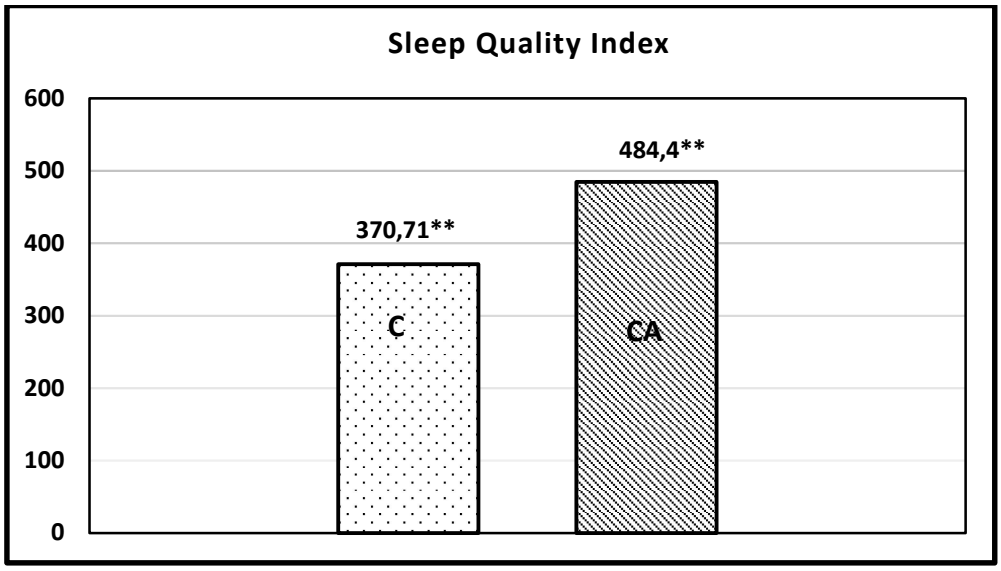

Figure 4. Sleep Quality Index of Richard Campbell

**There is a statistically significant difference between groups (p<0.001)

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Discussion and conclusion

Muscle strenght is one of the most important factor to athletic performance. Especially it is closely related to sportive skills such as jumping, changing direction, sprinting and balance (Suchomel et al., 2016). High muscle strength also reduces the risk of injury (Suchomel et al., 2016).

Muscle damage and muscle soreness were known to ocur after high intensity unusual muscular activities (Eston et al., 2004). The resulting muscle damage causes limitation in joint movements, muscle soreness and decrease in muscle strength, subsequently in decreased athletic performance (Saka et al., 2009). It is known that the pain due to muscle

damage starts to increase at 24 hours and decrease after peaking at 48-72 hours (Akkurt et al., 2015; Mahmoud HS, 2013). This situation can significantly affect the athletes who will enter the competition during this period.

In this study we aimed to occure muscle soreness by performing an unusual exercise for athletes. Thus, we considered to search the effect of wet cupping application on muscle soreness. In our result, when quadriceps VAS scores were evaluated, CAG's VAS scores are statistically significant lower than CG's VAS scores at all time periods. When evaluated within the group, there is a statistically significant difference between 24th hour and post exercise, 72nd hour. Moreover, there is a statistically significant difference between 48th and post exercise, 72nd hour ($p<0.05$). Likewise when hamstring VAS scores were evaluated, CAG's VAS scores are statistically significant lower than CG's VAS scores at all time periods ($p<0.05$). In addition, there is a statistically significant difference between 24th hour and post exercise, 48th hour, 72nd hour. Moreover, there is a statistically significant difference between 48th and 72nd hour ($p<0.05$).This result shows that wet cupping application significantly reduces muscle soreness. In addition, wet cupping application prevents to occur muscle soreness at 24th, 48th, 72nd hours.

According to the Taibah theory, which explains the mechanism of wet cupping application, there is interstitial fluid, older erythrocytes, heavy metals, immune complex deposits, cytokines, metabolic wastes, pain neurotransmitters in the blood taken from the cups. These materials are taken out from body with wet cupping application. It is suggested that the endorphin and cortisol increases after the wet cupping application, and as a result, the pain decreases (Bridgett et al., 2018). It has been stated that nonspecific low back and neck pain decreases with wet cupping application and the pain threshold is increased. (Fousekis & Kounavi, 2016; Lauche et al., 2011). It is stated that the application of cupping in nonspecific low back pain in football players decreases the pain while increasing the range of motion. (Hong et al., 2006; Sadek, 2016). In addition, it is stated that CK due to muscle damage can be reduced with moxibustin and wet cupping application (Sun et al., 2012).

There is suggested that wet cupping application increases isokinetic leg muscle strengt (BarisKaravelioglu, 2019). However, in this study we did not find a significant difference between CAG and CG for quadriceps strength. ($p>0.05$). This result may be due to the difference between the region where the cupping was applied and the muscle strength was measured. Inf act, when applications were performed around the legs we were expecting strenght increases. Since some blood is taken out in wet cupping application, the question may arise that muscle strength may be affected. However, there is no still evidence enough for this hypotes.

It is seen that sleep quality increases significantly with the application of the wet cupping. Sleep is one of the parameters that affect athletic performance (Watson, 2017). Because regeneration activities increase during sleep (Watson, 2017). In addition, insomnia related to anxiety before the match can be seen in athletes, which may affect the performance. As a resuls, wet cupping application can resolve this problem and can increase athletic performance due to improving sleep quality. There are studies related to the fact that cupping application improves sleep quality (Zhang et al., 2010).

It has been suggested that cupping application increases performance as a result of decreased muscle-joint pain and inflammation (Musumeci, 2016). However, our results, we can state that wet cupping application reduces muscle soreness, improves sleep quality, but does not seem to increase muscle strength.

Kısaltmalar / Abbreviations

F Frekans
N Sample size (Örneklem büyüklüğü)
$\overline{X}$ Mean (Ortalama)

Ss Standard deviation (SD) (Standart sapma)
F F-ratio (ANOVA test statistic) (F değeri)
P P-value (Anlamlılık değeri)

Beyanlar / Declarations

Etik Onay ve Katılım Onayı / Ethics approval and consent to participate

"Sporcularda Islak Kupa Uygulamasının Kas Gücü, Kas Ağrısı ve Uyku Kalitesi Üzerindeki Etkisi" başlıklı bu araştırmaya Kayseri Şehir Hastanesi GETAT Klinik Araştırmalar Etik Kurulu Komisyonu tarafından 10.06.2020 tarih ve 5 sayılı karar ile onay verilmiştir. Bu doğrultuda, çalışmanın hazırlanma ve yazım sürecinde "Yükseköğretim Kurumları Bilimsel Araştırma ve Yayın Etiği Yönergesi" çerçevesinde tüm bilimsel ve etik kurallara ve alıntı ilkelerine tam olarak uyulmuştur. Çalışma kapsamında toplanan verilere hiçbir müdahalede bulunulmamış, veriler üzerinde herhangi bir tahrifat yapılmamıştır. Ayrıca, bu çalışma daha önce herhangi bir akademik yayın organına değerlendirilmek üzere gönderilmemiştir. Çalışma ile ilgili doğabilecek her türlü etik ihlal durumunda tüm sorumluluk yazara aittir.

This study titled "The Effect of Wet Cupping on Muscle Strength, Muscle Pain and Sleep Quality in Athletes" was approved by the Kayseri City Hospital GETAT Clinical Research Ethics Committee Committee with the decision numbered 5 dated 10.06.2020. Accordingly, all scientific and ethical rules and citation principles were fully complied with within the framework of the "Higher Education Institutions Scientific Research and Publication Ethics Directive" during the preparation and writing process of the study. No intervention was made to the data collected within the scope of the study, and no falsification was made on the data. In addition, this study has not been previously sent to any academic publication organ for evaluation. All responsibility for any ethical violations that may arise regarding the study belongs to the author

Veri Ve Materyal Erişilebilirliği / Availability of data and material

Bu çalışmanın bulgularını destekleyen veriler, makul talepler üzerine sorumlu yazardan temin edilebilir. Veri seti yalnızca akademik amaçlar için erişilebilir olacak ve verilerin herhangi bir kullanımı, orijinal çalışmayı referans gösterecek ve katılımcıların gizliliğini koruyacaktır.

The data that support the findings of this study are available from the corresponding author upon reasonable request. The dataset will be accessible only for academic purposes, and any use of the data will recognize the original study and maintain the confdentiality of the participants

Çıkar Çatışması / Competing interests

Yazarlar, bu makalede sunulan çalışmayı etkileyebilecek herhangi bir çıkar çatışması veya kişisel ilişkiye sahip olmadıklarını beyan etmektedirler.

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Fon Desteği / Funding

Herhangi bir fon almamıştır.

None

Yazar Katkıları / Author contributions

Çalışmanın Çalışmanın tasarımı ve planlanması: S.A., Ç.Ç.; Veri toplama, analiz ve yorumlama: S.S., K.M.; Makalenin hazırlanması: S.A., Ç.Ç.; Veri düzenleme, yöntem geliştirme, yazım --- özgün taslak, yazım --- gözden geçirme ve düzenleme: S.S., K.M.; Tüm yazarlar, makalenin temel noktalarını eleştirel bir bakış açısıyla değerlendirmiş ve son halini onaylamıştır.

Design and planning of the study: S.A., Ç.Ç.; Data collection, analysis, and interpretation: S.S., K.M.; Manuscript preparation: S.A., Ç.Ç.; Data organization, methodology development, writing --- original draft, writing --- review and editing: S.S., K.M.; All authors critically reviewed the key points of the manuscript and approved the final version.

Teşekkür / Acknowledgements

Sağladığı destekten dolayı Erciyes Üniversitesi Yüksek İrtifa ve Spor Bilimleri Uygulama ve Araştırma Merkezi'ne (YİSBAM) içten teşekkürlerimizi sunarız.

We would like to express our sincere gratitude to Erciyes University High Altitude and Sports Sciences Application and Research Center (YİSBAM) for its support.).

APA Citation
Karakuş, M., Sucan, S., Çelenk, Ç., Akkurt, S., & Çelikkol, K. Z. (2025). Effect of wet cupping application on muscle strength, muscle soreness and sleep quality in athletes. International Journal of Health, Exercise, and Sport Sciences (IJOSS), 2(2), 9–17.

MLA Citation
Karakuş, Mustafa, et al. "Effect of Wet Cupping Application on Muscle Strength, Muscle Soreness and Sleep Quality in Athletes." International Journal of Health, Exercise, and Sport Sciences (IJOSS), vol. 2, no. 2, 2025, pp. 9–17.

ISO 690 Citation
KARAKUŞ, Mustafa; SUCAN, Serdar; ÇELENK, Çağrı; AKKURT, Soner; ÇELIKKOL, Kardelen Zümrüt. Effect of Wet Cupping Application on Muscle Strength, Muscle Soreness and Sleep Quality in Athletes. International Journal of Health, Exercise, and Sport Sciences (IJOSS), 2025, vol. 2, no. 2, p. 9–17.

Vancouver Citation
Karakuş M, Sucan S, Çelenk Ç, Akkurt S, Çelikkol KZ. Effect of wet cupping application on muscle strength, muscle soreness and sleep quality in athletes. Int J Health Exerc Sport Sci (IJOSS). 2025;2(2):9–17.

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