

# Safety of Applying Cupping Therapy to Treat Musculoskeletal Pathologies

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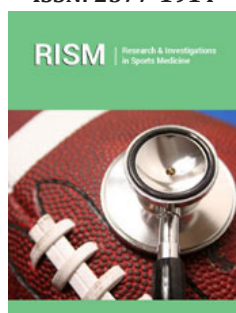
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ISSN: 2577-1914



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**Submission:**  November 18, 2021

**Published:**  December 03, 2021

Volume 8 - Issue 1

**How to cite this article:** Cage SA, Peebles RL, Coulombe B, Warner BJ, Gallegos DM, Galbraith RM, Cox C. A Brief Review of the Impact of Ergogenic Supplements for Athletes. *Res Inves Sports Med*, 8(1), RISM.000678. 2021. DOI: [10.31031/RISM.2021.08.000678](https://doi.org/10.31031/RISM.2021.08.000678)

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## Abstract

Cupping therapy is becoming a popular therapeutic modality employed by athletic trainers and other allied healthcare professionals. It uses negative pressure to reduce pain, increase blood flow, and improve muscle function. Like many other therapeutic interventions, adverse effects related to cupping therapy treatment can occur. The majority of these effects-particularly muscle soreness-are mild and similar to those encountered in other treatments. While severe adverse events following treatment with cupping therapy have been reported, these events are rare and can often be explained by poor clinician education or flawed methodology. The risks associated with cupping therapy are comparable to, and sometimes fewer than, those associated with other contemporary therapeutic interventions. Proper clinician education, methodology, patient education, and patient communication are crucial when attempting to mitigate the risk of adverse effects related to cupping therapy.

## Introduction

Cupping therapy, or myofascial decompression, is a therapeutic technique that has been documented as early as 3300 BC [1]. Used by healthcare professionals globally, cupping creates negative pressure at the treatment site for the purpose of increasing blood flow, reducing pain, increasing flexibility, and increasing function [2-4]. After receiving mainstream exposure during the 2016 Olympics, cupping therapy began to grow in popularity in the United States and Western Europe [1]. Some of this popularity can be attributed to increased media interest resulting from popular athletes, such as Michael Phelps, having received this type of treatment [5,6]. While there remains no consensus on a standardized methodology for prescribing and applying cupping therapy to either amateur or professional athletes, this treatment technique continues to grow in popularity [1]. The lack of consensus can be attributed in part to a lack of high-quality studies and no agreed-upon standardized methodology [4,7]. A clinical experts' statement was published in 2019 to provide some level of guidance to clinicians looking to use cupping therapy. However, the need for well-designed, rigorous studies is still apparent [8].

Previous studies have reported that cupping therapy has a positive effect on both local and regional blood flow [3,9,10]. When a cup is applied to the treatment site, the underlying tissue is subjected to negative pressure that results in compression of the tissue in contact with the rim of the cup and decompression of the tissue inside the cup. The lower pressure within the cup can lead to a pressure differential between the skin within the cup and the underlying

superficial blood vessels [11]. When exposed to this change in pressure, vasodilation occurs, which causes localized increased blood flow at the treatment site [11]. This increased blood flow may be the mechanism resulting in reduced pain outcomes found in research [12].

There may also be other mechanisms through which cupping therapy can modulate pain. It has been reported that while the marks left on the body by cupping therapy are healing, macrophages are attracted to the treatment site [12]. The prevalence of the enzyme heme oxygenase-1 (HO-1) has been found to increase in tissues treated with cupping therapy [12]. As the body catalyzes HO-1, the bi-products include heme, biliverdin, bilirubin, carbon monoxide, and iron [12]. During this process, iron is sequestered by ferritin, and the other biproducts have antioxidant, anti-inflammatory, and neuromodulatory effects that may create a more optimal environment for healing and ultimately pain reduction [12].

As previously mentioned, cupping therapy has increased in popularity among clinicians in recent years. Researchers have also begun a more extensive investigation into the uses of cupping therapy when caring for athletes [1]. Additionally, recent studies have reported that cupping therapy is used by the majority of clinical athletic trainers surveyed [13-15]. However, some clinicians and patients have expressed reservations regarding cupping therapy's safety. Thus, the purpose of this review is to describe the safety of cupping therapy as a therapeutic modality for musculoskeletal pain.

### Safety of Cupping Therapy

Within the current literature, there do not appear to be any systematic reviews or clinical trials that have reported severe adverse effects from cupping therapy [16-19]. One study went so far as to state that cupping therapy has fewer side effects than acetaminophen when treating musculoskeletal pain [18]. The authors noted particular concern regarding the effects that oral analgesics might have on the upper gastrointestinal tract [18]. Indeed, most of the reported mild adverse effects of cupping therapy are similar to those of other commonly used therapeutic modalities [16]. However, cases of adverse events following cupping therapy have been reported, particularly when performed improperly or by an untrained professional.

### Muscle Soreness

The most commonly reported side effect of cupping therapy is muscle soreness at the treatment site [16,19]. This discomfort can be due to several factors, including the amount of negative pressure applied and the frequency and duration of the treatments. Despite this potential effect, the level of discomfort was notably reported to be tolerable in one study [19]. When compared to other therapeutic interventions, mild muscular soreness is not an uncommon side effect [20,21]. One case report of a patient who had been treated with massage resulted in severe radicular pain [22]. While muscular pain is certainly something clinicians must attempt to minimize when performing any treatment, proper cupping therapy training and techniques appear to minimize these concerns [8,16,23].

### Skin Conditions

The circular marks that may appear during or after cupping therapy can elicit negative emotions from patients [24]. Researchers have noted that these responses can lead to patients being reluctant to continue receiving cupping therapy [24]. Therefore, it is important that clinicians educate patients on the nature of these marks, as such knowledge may help to resolve patients' concerns.

When cupping therapy is applied, the negative pressure that is created can cause the underlying capillaries to dilate. This dilation can lead to capillary rupture and subsequent ecchymosis [12]. When capillary rupture occurs, macrophages become attracted to the treatment site, and this stimulates the production of HO-1 [12]. Based on this information, the marks left by cupping therapy may be a factor in creating a more optimal healing environment. As part of patient education, it is important to note that while cupping marks are similar in appearance to bruises, they do not have the accompanying trauma to non-vascular tissue that is associated with traumatic injuries [12].

Another effect that cupping therapy has been reported to have on treatment sites is blistering of the skin [24-27]. The majority of the literature reporting blistering following cupping therapy is in the form of case studies [24-26]. In these cases, the common factor was flawed methodology. One case involved a clinician who had not been trained in the prescription and application of cupping therapy [25]. Another reported a patient receiving cupping therapy while his private airplane was airborne, and the cabin was pressurized [27]. All these cases reasserted the need for proper training and education prior to using cupping therapy [24-26]. Studies that investigated the contents of blistered skin found no harmful pathogens [26,27]. One study found that the blister fluid contained proteins that have been shown to play a role in anti-oxidation, tissue repair, and metabolic reactions [27]. While blistering should be avoided through proper clinician training and education, if a blister does occur, normal wound care procedures should be followed [8].

### Severe Events

As with many treatment techniques, severe adverse effects related to cupping therapy have been reported. Similar to the aforementioned side effects, within skin and muscle, the evidence on these severe events is limited to case reports. While these cases are noteworthy and should serve as cautionary information for clinicians, such adverse effects would likely be reported in more literature if they were widely prevalent. Some of these severe events included iron deficiency anemia, intraperitoneal hemorrhage, and cervical artery dissection [25,28,29]. Once again, these cases were the result of improperly trained clinicians using flawed methodology.

### Precautions

As with many other modalities, cupping therapy can result in adverse effects for patients. The risk of these events occurring increases when clinicians are improperly trained or use unsafe treatment methods [8,23]. Currently, there is a paucity of high-

level, rigorous, randomized controlled trials that would be required to create an evidence-based standardized method of practice [1,8]. In this absence of evidence, researchers have published an

expert-driven statement on recommendations for cupping therapy prescription and application [8]. These recommendations are presented in Table 1.

**Table 1:** Recommendation for the prescription and application of cupping therapy [8].

Indications	
1.	Musculoskeletal pain
2.	Neurological pain
3.	Muscle tightness
4.	Myofascial adhesions
5.	Subacute and chronic muscular injuries
Contraindications	
1.	Open wounds
2.	Pregnancy (particularly over the lower back and abdomen)
3.	Neurovascular compromise
4.	Acute muscular injuries
Application	
1.	Use a medium such as coconut oil or seedless massage oil to minimize patient discomfort.
2.	Therapeutic effects can be seen after as little as 10 minutes of treatment.
3.	Static cupping therapy can be safely used for up to 30 minutes, provided the patient is comfortable.
4.	When treating a patient who has not been cupped before, start with minimal pressure to gauge the patient's tolerance.
5.	Clinicians should not use an amount of negative pressure that elicits a painful response.
6.	Provided a patient's discomfort has not increased, and the patient can easily tolerate the amount of negative pressure, clinicians can use cupping therapy at a treatment site with muscle soreness.
Reasons to Discontinue Treatment	
1.	If a patient express discomfort, discontinue treatment.
2.	If blisters form during treatment, discontinue treatment.
3.	If blisters form, follow standard wound care procedures.
4.	If a patient becomes lightheaded, discontinue treatment.
5.	The presence of ecchymosis related to a previous cupping treatment does not mean a patient cannot be treated again, as long as the patient is not sore at the treatment site.

## Summary

The purpose of this review was to describe the currently available literature related to the safety of using cupping therapy to treat muscular pain. While the current literature does report that cupping therapy has potential adverse effects, these events are mostly mild in nature [16]. The risk of both mild and severe adverse effects can be mitigated through proper techniques and training [16,23]. Provided clinicians undergo education and training, cupping therapy appears to be a safe treatment for muscular pain. Clinicians should also be sure to educate their patients on the nature of these effects prior to treatment, particularly the circular marks that can occur during or after cupping therapy [12].

In comparison with other therapeutic interventions, cupping therapy appears to have comparable or fewer potential adverse effects. Massage, therapeutic ultrasound, electrical stimulation, ibuprofen, acetaminophen, and cold-related modalities have all been reported as having potentially adverse effects [20-22,30-

35]. Regarding systemic effects, cupping therapy has fewer risks than ibuprofen or acetaminophen [30,31,35]. When reviewing the literature on effects on the skin, more cases of adverse effects appear to have been reported for electrical stimulation without the same potential therapeutic benefits of marks left by cupping therapy [33,34]. Based on this information, cupping therapy appears to be a reasonably safe therapeutic modality compared to other contemporary interventions.

In conclusion, cupping therapy is a therapeutic modality that is widely used by allied healthcare professionals. As this treatment continues to grow in popularity, clinicians need to be aware of its potential adverse effects. Provided clinicians have undergone proper training and employ the proper technique, cupping therapy is a relatively safe treatment option for muscular pain. Patient education and communication before, during, and after treatment are critical to ensuring that patients are at minimal risk for an adverse outcome.

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