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Review Article

An Overview of Mechanisms and Clinical Applications of Wet cupping therapy (Ḥijāma-bil-Sharṭ): A Comprehensive Review

Sadaf Nawaz [1], Mohd Anwar [2], Fatima Khan [3]

[1] PG Scholar, Department of Ilaj Bit Tadbīr, AKTC, AMU, Aligarh, India,
[2] Professor, Department of Ilaj Bit Tadbīr, AKTC, AMU, Aligarh, India,
[3] Assistant Professor, Department of Ilaj Bit Tadbīr, A&U Tibbia College, Karol Bagh, New Delhi, India.

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For Correspondence:

Sadaf Nawaz, Department of Ilāj-bit-Tadbīr, Ajmal Khan Tibbiya College, Faculty of Unani Medicine, Aligarh Muslim University, Aligarh – 202002.

Abstract

Background: Wet cupping therapy (WCT), also known as *Ḥijāma-bil-Sharṭ*, is a traditional therapeutic modality widely practiced in complementary and alternative medicine. In recent years, increasing scientific interest has focused on elucidating its physiological mechanisms and evaluating its clinical efficacy across various health conditions. **Objective:** To provide a comprehensive review of the historical evolution, underlying mechanisms, and therapeutic applications of wet cupping therapy, integrating traditional concepts with contemporary biomedical evidence. **Methods:** A structured literature review was conducted using databases including PubMed, ScienceDirect, and Google Scholar. Relevant English-language publications, including original research articles, clinical trials, review papers, and classical medical texts, were identified using keywords such as "wet cupping," "*Ḥijāma-bil-Sharṭ*," and "mechanisms of action." Studies addressing mechanisms, clinical outcomes, safety, and traditional perspectives were included, while duplicates and low-quality studies were excluded. **Results:** WCT appears to exert therapeutic effects through multiple mechanisms, including haemodynamic modulation, nitric oxide-mediated vasodilation, neurophysiological pain regulation via Diffuse Noxious Inhibitory Controls and Pain Gate Theory, and potential immunomodulatory and biochemical alterations. Evidence supports its effectiveness in pain management, particularly in musculoskeletal conditions such as low back pain and arthritis. Additional benefits have been reported in neurological disorders, sleep quality, cardiovascular health, and fertility, although evidence remains limited. **Conclusion:** Wet cupping therapy demonstrates promising therapeutic potential as a complementary intervention. However, current evidence is limited by methodological heterogeneity and lack of standardization. Further high-quality randomized controlled trials and mechanistic studies are required to establish its efficacy, safety, and integration into evidence-based clinical practice.

Keywords: *"Wet cupping"*, *"Ḥijāma-bil-Sharṭ"*, *"Cupping therapy"*, and *"Mechanisms of action"*

1. Introduction:

Ḥijāma, or cupping therapy, boasts an illustrious history that spans diverse civilizations, signifying its universal appeal and therapeutic credibility across epochs. Earliest references trace back to ancient Egyptian papyri, notably the Ebers Papyrus, which mentioned cupping as a remedy for various ailments around 1550 B.C.[1] Beyond Egypt, the Chinese have a rich tapestry of cupping practices woven into their medical traditions, documented in seminal works like the 'Huangdi Neijing' dated around 2nd century B.C.[2] Furthermore, the Greeks, with writings from the influential physician Hippocrates, also advocated for cupping as a treatment modality around the 5th century B.C.[1] According to Arabic writers, cupping therapy is in use since 3500 BC where Assyrians were the first Arab population to use primitive tools as animal horns, pottery cups, bamboo cups for cupping therapy. Arabic civilization termed cupping therapy, *"Al-Ḥijāmah"* (which means in Arabic: to suck), where it was used in treating hypertension, polycythemia, headache, migraine and drug intoxication.[3]

The ancient Greek physician Hippocrates compiled extensive descriptions of the cupping application. He described two different types of cups: one with a narrow opening and a long handle and the other with a wider opening. The first type was used to treat deep accumulation of fluids, while the second type was used to treat the spread of pain.[4] In 400 B.C., Herodotus (a Greek historian) recorded that the ancient Egyptian physicians who recommended the use of sucking cups to the body have already used both wet cupping therapy and dry cupping therapy and treated various diseases by application of cupping therapy including headache, loss of appetite, indigestion, fainting, to drain abcess, narcolepsy and others.[5]

Jalinūs (130-201 AD) a renowned Unani physician also recommended cupping for a major therapeutic option, perhaps even more so. He prescribed the wet cupping procedure for balance of ailments.[6] *Al-Zahrawi* (936-1036 AD) a great surgeon, described cupping and its uses in detail. He explained the specific sites of cupping as well as gave description of equipments diagrammatically which should be used during procedure.[3] Ibne Sina (980-1037 AD) the foremost and best-known practitioner of cupping, generally accepted as the "Prince of Physicians", his

thoughts on the procedure are presented in his famous book, namely the *AlQanoon-Fit-Tibb*. He not only detailed the underlying theory and the target disorders which would benefit, also advised on patient selection and preparation, actual technique and best time for the procedure. Other advice related to where on the body the cups should be positioned and for how long.[6]

Ismail Jurjani (d. 1140 AD) mentioned the age restriction for *Ḥijāmat* and describes the contraindications in children and elderly people.[7] *Ibne Hubal* (1122-1213 AD) writes in his book "*Kitab-ulMukhtarat-Fit-Tibb*" that *Ḥijāmat* sucks out the blood from those minor vessels which are scattered under the muscles and skin, so it does not produce weakness like *Fasd*. Further he described that cupping have the property to reduce the congestion locally and also from adjoining structures.[8]

Cupping therapy practice spread to Italy and, subsequently, the rest of Europe between the 14th and 17th centuries, during the Renaissance. Cupping was a very popular treatment of gout and arthritis in Italy during this period.[5] Cupping therapy fell out of favor in 17th and mid-18th centuries but recovered popularity in modern medicine.[9] In recent years cupping is becoming very popular mode of treatment and gaining fame globally. A number of studies reported and revealing the efficacy and value of cupping either alone or with combination of other therapies.[3]

2. Materials & Methods:

This review was conducted through a structured and comprehensive search of scientific literature to gather relevant information on the historical background, mechanisms, and therapeutic applications of wet cupping therapy (*Ḥijāma-bil-Sharṭ*). The databases consulted for this purpose included PubMed, ScienceDirect, and Google Scholar, which were selected due to their wide coverage of biomedical and complementary medicine literature.

The literature search focused on English-language articles published up to 2024, using a combination of Medical Subject Headings (MeSH) and free-text terms. The primary keywords and phrases employed included: *"Wet cupping"*, *"Ḥijāma-bil-Sharṭ"*, *"Cupping therapy"*, and *"Mechanisms of action"*. Boolean operators (AND, OR) were used to refine the search strategy and broaden the scope of retrieved articles.

Studies included in the review comprised original research articles, review papers, historical texts, and clinical trials that discussed any of the following:

- Historical and cultural evolution of wet cupping
- Physiological or molecular mechanisms underlying its therapeutic effects
- Clinical applications and outcomes in various conditions
- Safety, contraindications, and procedural details

Papers were screened by title and abstract, and full texts were retrieved for those deemed relevant. Duplicates and articles lacking sufficient detail or scientific validity were excluded. In addition, classical Unani and Greco-Arabic sources were consulted where available, especially those that contributed to the traditional understanding and documentation of cupping therapy.

This methodology ensured the inclusion of both modern scientific perspectives and traditional frameworks, providing a holistic overview of wet cupping therapy in both historical and contemporary contexts.

3. Results:

3.1 1. Types of cupping:[10]

Cupping therapy can be classified (as mentioned in Fig.1) on the basis of:

1. Application Techniques
2. Suction Intensity
3. Suction Methods
4. Materials or Enhancements
5. Area Treated
6. Specialized or Modern Adaptations

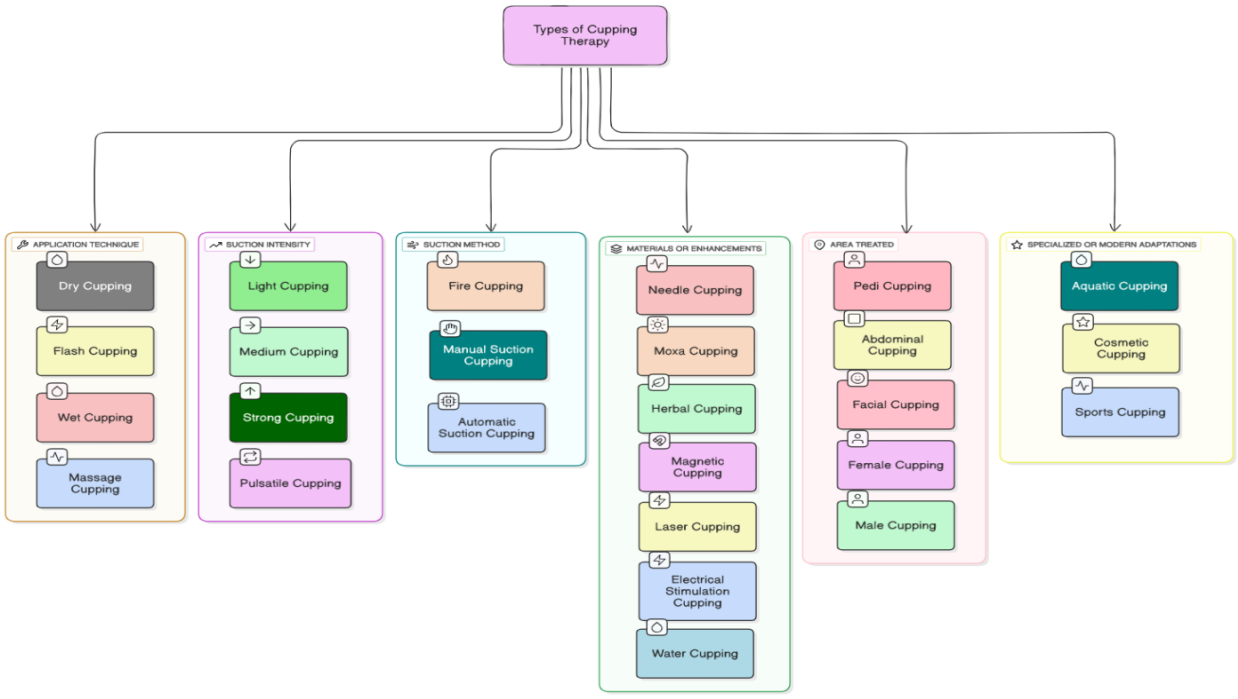

Figure 1: Classification of Cupping Therapy

Mechanisms of Wet Cupping Therapy (WCT)

Haemodynamic Theory

The haemodynamic mechanism of wet cupping therapy (WCT) is primarily explained by the Taibah theory, which proposes that cupping facilitates the clearance of pathological substances such as excess iron, ferritin, and lysed red blood cells from both blood plasma and interstitial fluid. In chronic inflammatory states, tissue function is compromised due to reduced capillary perfusion and increased leukocyte activation, which elevates interstitial pressure and disrupts normal microcirculation.[11]

Application of cupping induces localized hyperaemia through vasodilation of cutaneous capillaries, driven by pressure gradients between the skin surface and underlying microvasculature.[12]Additionally, the negative pressure generated by the cup leads to compression at the rim–skin interface, temporarily occluding superficial microcirculation.[13] Upon release, a phenomenon analogous to post-occlusive reactive hyperaemia occurs, resulting in increased blood flow and enhanced tissue perfusion.[14] This dynamic process may contribute to improved removal of inflammatory mediators and restoration of microvascular function.

Blood Detoxification Theory

The blood detoxification theory suggests that WCT aids in the removal of metabolic waste products and harmful substances from localized tissues. Evidence indicates significant alterations in biochemical and haematological parameters, including reductions in uric acid, HDL, LDL, and modifications in haemoglobin structure and function following cupping. [1516]

From a biophysical perspective, the negative pressure exerted during cupping facilitates the extraction of pathological materials such as inflammatory exudates, microbial agents, purulent substances, and tissue-degrading enzymes. This process not only assists in detoxification but also promotes granulation tissue formation and accelerates wound healing.[17]

Studies comparing venous blood with cupping-derived blood have demonstrated notable differences in biochemical and immunological indices, supporting the hypothesis that cupping selectively removes pathological components.[16] Furthermore, the mechanical disruption of localized blood stasis enhances circulation and facilitates toxin elimination, while the use of multiple cups may amplify these therapeutic effects.[18]

WCT is also thought to contribute to the clearance of senescent erythrocytes and improve metabolic exchange at the tissue level. Increased local blood flow enhances nutrient delivery and waste removal, thereby supporting systemic detoxification processes. Additionally, elevated concentrations of heavy metals such as mercury, lead, aluminium, and silver in cupping blood compared to venous samples further support its role in removing toxic elements from the body.[15]

Nitric Oxide (NO) Theory

Nitric oxide (NO) is a crucial gaseous signalling molecule involved in vasodilation, regulation of blood flow, immune modulation, and neurotransmission.[19] The Nitric Oxide Theory proposes that cupping therapy stimulates endothelial cells to release NO, thereby producing multiple physiological benefits.

Experimental evidence has demonstrated increased expression of nitric oxide synthase (NOS) the enzyme responsible for Nitric Oxide production particularly around stimulated skin areas.[20] Moreover, endothelium-derived relaxing factor (EDRF), identified as Nitric Oxide, plays a central role in mediating vasodilation in response to endothelial stimulation.

The release of Nitric Oxide during cupping leads to relaxation of vascular smooth muscle, reduced vascular resistance, and improved blood circulation. It also inhibits platelet aggregation, leukocyte adhesion, and smooth muscle proliferation, thereby contributing to cardiovascular protection and prevention of atherosclerosis.[21]

Furthermore, Nitric Oxide plays an essential role in wound healing by promoting collagen synthesis and improving tensile strength of tissues. Studies have also shown that cupping enhances dermal blood perfusion through vasodilation mediated by vasoactive substances such as histamine, adenosine, and noradrenaline.[22,23]Elevated Nitric Oxide levels observed in cupping blood samples further support this mechanism.[24]

Diffuse Noxious Inhibitory Controls (DNIC)

The DNIC theory explains the analgesic effect of cupping through activation of endogenous pain inhibitory pathways. DNIC refers to a neurophysiological process in which a noxious stimulus suppresses the perception of another painful stimulus, often described as “pain inhibits pain”. [25]

The localized tissue injury and capillary disruption caused by cupping act as a conditioning stimulus, activating nociceptive pathways and triggering central pain modulation. This process involves inhibition of nociceptive neurons at the spinal level and may also engage supraspinal mechanisms.[26]

Additionally, cupping may stimulate mechanosensitive peripheral nerves, including Aδ and C fibres, which play a role in activating DNIC pathways.[27] The analgesic effect may also be partly attributed to reduction of oxidative stress and removal of free radicals, further contributing to pain relief. [16] Cognitive factors, such as distraction, may also enhance this effect.[28]

Reflex Zone Theory

Reflex Zone Theory (RZT) is based on the concept that pathological changes in internal organs can manifest as alterations in corresponding skin regions due to shared neural pathways. Cupping therapy stimulates these cutaneous reflex zones, leading to therapeutic effects on related organs.[15]

The suction effect induces dry diapedesis, allowing red blood cells to pass into interstitial tissues without capillary rupture, which are subsequently cleared by connective tissue. This process enhances local circulation and initiates a cascade of biological responses within the affected region. [15]

Somatic stimulation of the skin has been shown to influence visceral organ function through spinal and autonomic pathways.[27,29] Clinical manifestations such as skin discoloration, oedema, and altered temperature in reflex zones are indicative of underlying organ dysfunction.[30]

By stimulating these hypersensitive areas, cupping may improve blood flow and modulate neural activity, thereby enhancing both local tissue health and systemic organ function.[31]

Activation of Immune System Theory

Recent studies suggest that cupping therapy may exert immunomodulatory effects. Proteomic analyses have revealed increased expression of proteins associated with immune response, oxidative stress, and metabolism in cupping-induced blister fluid compared to burn blisters.[32] Cupping may promote a shift in macrophage polarization from a pro-inflammatory M1 phenotype to an anti-inflammatory M2 phenotype, contributing to resolution of inflammation.[33] This effect is supported by increased levels of cytokines such as IL-4, which are involved in M2 macrophage activation.[34]

Additionally, studies have shown that cupping increases anti-inflammatory lipid mediators while reducing pro-inflammatory lipids, thereby suppressing inflammatory pathways such as IL-6 signalling.[35] Although these findings indicate potential systemic immune effects, further research is required to fully elucidate the underlying mechanisms.

Pain-Gate Theory (PGT)

The Pain Gate Theory, proposed by Melzack and Wall (1965), provides a widely accepted explanation for the analgesic effects of cupping.[36] According to this model, pain perception is regulated at the level of the spinal cord through interaction between small-diameter (pain-transmitting) and large-diameter (touch and pressure) nerve fibers.[37]

Cupping stimulates both nociceptive and mechanoreceptive fibers, increasing afferent input to the central nervous system. Activation of large-diameter fibers enhances inhibitory interneuron activity in the dorsal horn, effectively "closing the gate" and reducing transmission of pain signals.[38]

The therapy also activates Aδ and C fibers, engaging the spino-thalamo-cortical pathway and modulating pain perception.[39] The balance between excitatory and inhibitory inputs determines the overall pain experience, and cupping may shift this balance toward inhibition. [40–42]

Microparticle Clearance Theory (MCT)

Microparticles, or extracellular vesicles (EVs), are submicron membrane-bound structures released by cells under physiological and pathological conditions. [43] These vesicles, including erythrocyte-derived microparticles (EMPs), play a role in inflammation and immune activation.

EMPs are produced during red blood cell senescence and serve as a protective mechanism; however, they have also been implicated in systemic inflammatory responses and adverse clinical outcomes.[44–47] Other microparticles derived from platelets, leukocytes, and endothelial cells are similarly associated with pathological processes. [48]

The Microparticle Clearance Theory proposes that WCT may facilitate the removal of these pro-inflammatory vesicles from circulation, thereby reducing inflammatory burden. Supporting evidence indicates that certain microparticles can activate monocytes and contribute to disease severity and mortality in critically ill patients.[49] Thus, by modulating microparticle distribution and clearance, cupping therapy may offer a novel mechanism for reducing inflammation and improving systemic health.

3.2 Therapeutic Actions of wet cupping:

Pain Management:

Pain management is a key area where wet cupping therapy (WCT) has shown promising results. Several studies have highlighted the effectiveness of WCT in reducing pain severity and enhancing the overall well-being of individuals experiencing various types of pain, including lower back pain (Site of Cupping: at the areas of pain or the sacrum area, between the lumbar vertebrae and the coccyx bone) [50,51], and arthritis.[34] A review by Kim, published in 2011, found that 6 out of 7 trials demonstrated that cupping had a positive effect on conditions like low back pain, cancer pain, trigeminal neuralgia, and brachialgia paraesthetica nocturna when compared to usual care, anticancer drugs, analgesics, and heat therapy.[52]

Neurological Conditions:

Studies have shown that wet cupping therapy (WCT) is effective in managing neurological conditions such as migraines and vertigo.[53,54] The goal of WCT in these cases is to reduce inflammation, alleviate symptoms, and improve overall disease management. One of the main mechanisms through which WCT may achieve its anti-inflammatory effects is by promoting the removal of inflammatory mediators. The process of wet cupping, which involves suction and skin incision, stimulates the excretion of substances that contribute to inflammation, including pro-inflammatory cytokines, immune complexes, and toxic cellular products.[55] WCT has also been found beneficial in improving upper limb spasticity (Site of cupping :The center of the biceps brachii belly for patients with upper limb spasticity) and reducing shoulder pain (Site of cupping: Pain site of the affected shoulder for patients with hemiplegic shoulder pain) in post-stroke patients by controlling muscle tone

and relieving pain.[56] Therefore, incorporating wet cupping along with rehabilitation training should be considered as part of a comprehensive therapeutic protocol for stroke patients with upper limb spasticity.[57]

Sleep and Psychological Well-being:

Wet cupping therapy (WCT) has been studied as a potential method for improving sleep quality.[58] Beyond its pain-relieving effects, WCT may also positively impact sleep and overall well-being. Since sleep quality is vital for maintaining good physical and psychological health, disruptions in sleep can greatly affect a person's well-being. Cikar et al. conducted a study to examine the effectiveness of WCT on sleep quality in a healthy population, finding that all sleep quality parameters improved after WCT. This suggests that WCT may enhance sleep quality, which is crucial for overall well-being and daily functioning. The benefits might be linked to the sequential steps of wet cupping, such as skin incision and suction, which are believed to promote relaxation and improve blood circulation, potentially leading to better sleep quality.[58]

Cardiovascular Health:

Wet cupping therapy (WCT) has been investigated as a potential complementary treatment for cardiovascular conditions, particularly arterial hypertension. Arterial hypertension, commonly known as high blood pressure, is a widespread condition that significantly raises the risk of cardiovascular events, including heart attacks and strokes.[55] Cupping has been shown to effectively reduce LDL cholesterol and improve the LDL/HDL ratio, though it does not have a significant impact on total cholesterol, HDL cholesterol, or triglycerides. The improvement in the LDL/HDL ratio appears to be linked to the reduction in LDL cholesterol. Lowering plasma cholesterol levels reduces the availability of atherogenic lipoproteins and likely decreases cholesterol accumulation in the arterial intimae. Efforts to lower cholesterol are now a cornerstone of preventive cardiology, significantly contributing to the 50% reduction in coronary heart disease mortality in the United States, benefiting both those with existing coronary disease and healthy individuals.[59] Site of cupping: Interscapular area.

Impact on Fertility:

There is limited evidence suggesting that wet cupping therapy (WCT) may impact fertility. Although more research is necessary, one study reported improvements in fertility-related parameters in women with premature ovarian failure after undergoing wet cupping treatment.[60] Recently, there has been increasing interest in the potential of WCT to address female infertility. A pilot study by Abduljabbar et al. (2016) explored the effectiveness of WCT in treating female infertility and its effects on pregnancy rates and reproductive hormone profiles. The study found that spermiogram results improved during the therapy, with sperm parameters returning to normal after two months of treatment. Additionally, the man's premature ejaculation resolved completely after the therapy. Semen analysis, which provides crucial information about male fertility potential, is also essential in evaluating the success of infertility treatments. [61]

Site of cupping: Nine points of the posterior, bilateral thoracic, lumbar and sacral areas of the spine

4. Conclusion

Wet cupping therapy (WCT) demonstrates a range of potential therapeutic effects mediated through complex and interrelated physiological mechanisms. Current evidence suggests that its clinical benefits may be attributed to haemodynamic alterations, modulation of inflammatory and immune responses, neurophysiological pain regulation, and biochemical processes such as nitric oxide release. Among these, the analgesic effect remains the most consistently supported outcome, with plausible explanations grounded in established neurophysiological models.

Despite these promising findings, several proposed mechanisms—including detoxification, microparticle clearance, and systemic immunomodulation—require further scientific validation. The existing body of evidence is limited by methodological variability, small sample sizes, and a lack of standardized treatment protocols, which restricts the generalizability and reproducibility of results.

Clinically, WCT may serve as a complementary intervention, particularly in the management of musculoskeletal pain and certain chronic conditions. However, its application should be considered within an evidence-based framework and in conjunction with conventional therapies. Future research should prioritize well-designed randomized controlled trials, standardized procedural guidelines, and in-depth mechanistic studies to establish the efficacy, safety, and clinical relevance of WCT. Such efforts are essential to facilitate its integration into modern healthcare systems and to clarify its role as a scientifically grounded therapeutic modality.

Conflict of Interest: The authors declare that there is no conflict of interest regarding the publication of this paper. The authors alone are responsible for the content and writing of the manuscript. All authors have approved the final version of the manuscript.

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Author Contributions:

Sadaf Nawaz: Conceptualization, literature search, data synthesis, manuscript drafting, and final approval.

Mohd Anwar, Fatima Khan: Critical review, editing, supervision, and final approval.

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