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Research Article

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Wet Cupping (Hijama) as a Non-Pharmacological Approach for the Management of Musculoskeletal Pain and Inflammation

Md Balal Hossain[1], Md Noman Azam[2], Sonya Ghosh[3], Musomi Khandaker[4], Most. Raihanul Jannat Roshni[5], Md Samiul Bashir[6*]

Abstract

Background: Musculoskeletal pain is a leading cause of chronic disability and functional limitation. Due to limitations and adverse effects associated with long-term pharmacological therapy, non-pharmacological interventions such as wet cupping (Hijama) are increasingly being explored for pain and inflammation management.

Objective: To evaluate clinical effectiveness, inflammatory response, and safety of wet cupping (Hijama) in patients with musculoskeletal pain.

Methods: A cross-sectional study was conducted among 180 patients with musculoskeletal pain between March 2025 and June 2025. Pain severity was assessed using the Visual Analogue Scale (VAS), and functional outcome in knee osteoarthritis was evaluated using the KOOS score. Inflammatory markers (CRP, ESR, serum uric acid) and biochemical safety parameters (ALT, AST, ALP, hemoglobin) were measured at baseline and after four weeks of wet cupping therapy. Paired statistical tests were applied to compare pre- and post-treatment values. Multivariable linear regression analysis was performed to identify predictors of pain reduction.

Results: A significant reduction in pain severity was observed across all musculoskeletal conditions following wet cupping therapy. Mean VAS scores decreased significantly in cervical spondylosis (7.8 ± 0.9 to 3.9 ± 0.8), low back pain (7.6 ± 0.8 to 4.0 ± 0.7), frozen shoulder (7.7 ± 0.7 to 3.8 ± 0.6), and sciatic pain (8.1 ± 0.6 to 4.1 ± 0.8) ($p < 0.001$ for all). Functional improvement was demonstrated by a significant increase in KOOS scores among knee osteoarthritis patients (48.2 ± 4.1 to 66.8 ± 3.2, $p < 0.001$). Inflammatory markers showed significant improvement, with CRP levels decreasing from 3.6 ± 1.1 mg/L to 2.7 ± 0.9 mg/L and ESR from 29.4 ± 8.2 mm/hr to 21.6 ± 7.1 mm/hr ($p < 0.001$ for both). Serum uric acid levels demonstrated a non-significant reduction (5.8 ± 1.0 to 5.6 ± 0.9 mg/dL; $p = 0.08$). Biochemical parameters including ALT, AST, and ALP showed mild but statistically significant reductions ($p < 0.05$), while hemoglobin levels remained unchanged, indicating good safety and tolerability. Multivariable regression analysis identified baseline CRP ($\beta = 0.44$, $p < 0.001$), duration of pain ($\beta = 0.38$, $p < 0.001$), male gender ($\beta = 0.31$, $p = 0.002$), and age ($\beta = 0.02$, $p = 0.01$) as independent predictors of pain reduction following wet cupping therapy.

Conclusion: Wet cupping (Hijama) is an effective and well-tolerated non-pharmacological intervention for musculoskeletal pain, demonstrating significant improvement in pain severity, functional outcomes, and inflammatory markers.

Affiliation:

[1]Department of Health Sciences and Leadership, St. Francis College, New York, USA

[2]Department of Health Sciences and Leadership, St. Francis College, New York, USA

[3]Department of Epidemiology and Biostatistics, King Graduate School, Monroe University, New York, USA.

[4]Department of Epidemiology and Biostatistics, King Graduate School, Monroe University, New York, USA.

[5]Department of Emergency, AR Rafi Hospital & Diagnostic Center, Hazinagar, Dhaka, Bangladesh

[6]Department of Laboratory Medicine Institute of Health Technology, Kurigram, Bangladesh

***Corresponding author:**
Md Samiul Bashir. Department of Laboratory Medicine Institute of Health Technology, Kurigram, Bangladesh

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Introduction

Musculoskeletal pain represents a major global public health concern and remains one of the leading contributors to chronic disability, functional impairment, and diminished quality of life. According to global burden estimates, musculoskeletal disorders account for a substantial proportion of years lived with disability worldwide, affecting individuals across all age groups and socioeconomic strata [1]. Common conditions such as cervical spondylosis, low back pain, osteoarthritis, frozen shoulder, and sciatica are particularly prevalent and often coexist with occupational strain, aging, obesity, and sedentary lifestyles. The burden is especially pronounced in low- and middle-income countries, where limited access to specialized care and long-term rehabilitation exacerbates disease impact and economic costs [2]. Chronic musculoskeletal pain is increasingly recognized as a multifactorial condition involving not only structural and biomechanical abnormalities but also complex neuroinflammatory mechanisms. Persistent low-grade inflammation plays a central role in pain sensitization, peripheral and central nociceptive modulation, and progressive tissue degeneration [3]. Elevated inflammatory biomarkers, including C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR), have been associated with pain severity, functional limitation, and disease chronicity, highlighting inflammation as a critical therapeutic target in musculoskeletal disorders [4,5]. Conventional management strategies for musculoskeletal pain predominantly rely on pharmacological therapies such as non-steroidal anti-inflammatory drugs (NSAIDs), analgesics, muscle relaxants, and corticosteroids. While these agents are effective for short-term symptom relief, their long-term use is frequently constrained by adverse effects, including gastrointestinal bleeding, renal dysfunction, hepatotoxicity, and increased cardiovascular risk [6]. Additionally, pharmacological treatments often fail to address the underlying inflammatory and functional components of chronic pain, leading to incomplete or transient symptom control. These limitations have fueled growing interest in non-pharmacological and complementary interventions that offer sustained pain relief with improved safety profilesn [7]. Wet cupping therapy (Hijama) is a traditional therapeutic modality with historical roots in ancient medical systems and continued practice in many parts of the world. The technique involves the creation of localized negative pressure on the skin followed by superficial scarification, allowing the extraction of blood and interstitial fluids. From a biomedical perspective, wet cupping is hypothesized to exert therapeutic effects through multiple mechanisms, including enhancement of local microcirculation, reduction of oxidative stress, clearance of inflammatory mediators, modulation of immune responses, and alteration of nociceptive signaling pathways. These biological effects may collectively contribute to pain reduction, functional improvement, and attenuation of inflammatory processes [8]. In recent years, clinical studies have reported beneficial effects of wet cupping in various musculoskeletal conditions, demonstrating reductions in pain intensity and improvements in functional outcomes. Emerging evidence also suggests favorable changes in inflammatory markers following therapy. However, existing studies vary considerably in methodological quality, outcome measures, and duration of follow-up, limiting the generalizability of findings. Moreover, data regarding the biochemical safety of wet cupping, particularly its effects on hepatic enzymes and hematological parameter remain limited and inconsistently reported [9]. Notably, there is a paucity of comprehensive clinical studies evaluating the combined effects of wet cupping on pain severity, functional outcomes, inflammatory markers, and biochemical safety parameters within a single analytical framework. This gap is particularly evident in South Asian populations, where musculoskeletal disorders are highly prevalent and traditional therapeutic practices are widely utilized. A clearer understanding of the clinical effectiveness and safety profile of wet cupping is essential for its evidence-based integration into musculoskeletal pain management strategies. This study aimed to evaluate the effectiveness and safety of wet cupping (Hijama) in musculoskeletal pain.

Methodology

Study Design and Setting

This cross-sectional study was conducted at Ayesha Physiotherapy and Rehabilitation Centre, Savar, Bangladesh, over a four-month period from March 2025 to June 2025. The study was designed to evaluate the clinical effectiveness, inflammatory response, and biochemical safety of wet cupping (Hijama) as a non-pharmacological intervention for musculoskeletal pain in adult patients.

Study Population

Adult patients presenting with musculoskeletal pain were consecutively recruited during the study period. A total of 180 participants were enrolled, which was considered sufficient to detect clinically meaningful changes in pain severity, functional outcomes, and inflammatory markers following intervention. Eligible participants were aged 18 years or older and had clinically diagnosed musculoskeletal conditions, including cervical spondylosis, low back pain, frozen shoulder, knee osteoarthritis, sciatica, rheumatoid arthritis, or gout. Both acute and chronic pain cases were included. Patients with bleeding disorders, those receiving anticoagulant therapy, individuals with severe anemia or active infection, pregnant women, patients with chronic liver or renal disease, and those who had undergone cupping therapy within the preceding three months were excluded to ensure safety and minimize confounding.

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Intervention Procedure

Wet cupping (Hijama) was administered by trained healthcare personnel using a standardized protocol. After appropriate skin antisepsis, sterile cups were applied to anatomical sites corresponding to the patient's pain location to create negative pressure. Superficial skin incisions were then made, followed by controlled bloodletting. The procedure was performed under aseptic conditions, and all participants were observed for immediate adverse effects. Patients were followed up for 28 days after the intervention to assess clinical, inflammatory, and biochemical outcomes.

Data Collection and Outcome Measures

Baseline demographic and clinical data, including age, sex, occupation, duration and type of pain, and specific musculoskeletal diagnosis, were collected using a structured data collection form. Pain severity was assessed using the Visual Analogue Scale (VAS) for all musculoskeletal conditions except knee osteoarthritis, for which functional status was evaluated using the Knee Injury and Osteoarthritis Outcome Score (KOOS). These assessments were conducted at baseline and repeated on the 28th day following wet cupping therapy. Venous blood samples were collected at baseline and at the 28-day follow-up to evaluate inflammatory and biochemical parameters. Inflammatory markers included C-reactive protein (CRP), erythrocyte sedimentation rate (ESR), and serum uric acid. Biochemical safety parameters included alanine aminotransferase (ALT), aspartate aminotransferase (AST), alkaline phosphatase (ALP), and hemoglobin. All laboratory investigations were carried out using standard analytical methods in an accredited diagnostic laboratory following established quality control procedures.

Statistical Analysis

Statistical analyses were performed using SPSS software (version 26.0). Continuous variables were summarized as mean ± standard deviation, while categorical variables were expressed as frequencies and percentages. Changes in pain scores, inflammatory markers, and biochemical parameters before and after the intervention were analyzed using paired t-tests. To identify independent predictors of pain reduction, multivariable linear regression analysis was conducted with change in VAS score as the dependent variable. Statistical significance was defined as a p-value less than 0.05.

Ethical Considerations

The study was conducted in accordance with the principles of the Declaration of Helsinki. Written informed consent was obtained from all participants prior to enrollment, and strict confidentiality of personal and clinical data was maintained throughout the study.

Results

Baseline Demographic and Clinical Characteristics

A total of 180 patients with musculoskeletal pain were included in the final analysis. Baseline demographic and clinical characteristics are presented in Table 1. Most participants were middle-aged adults, with the highest proportion in the 31–45 years age group (40.0%), followed by those aged 46–60 years (33.3%). Males were slightly more predominant than females (57.8% vs 42.2%). Regarding occupation, 40.0% of participants were office-based workers, 35.6% were manual workers, and 24.4% were homemakers. Most patients reported a pain duration of six months or longer (67.8%), and chronic pain was more common than acute pain (71.1% vs 28.9%), indicating a predominantly chronic disease burden in the study population.

Table 1: Demographic and Clinical Characteristics of the Study Participants (n = 180).

Variable	Category	Number (n)	Percentage (%)
Age (years)	18–30	48	26.7
	31–45	72	40
	46–60	60	33.3
Gender	Male	104	57.8
	Female	76	42.2
Occupation	Manual worker	64	35.6
	Office-based	72	40
	Homemaker	44	24.4
Duration of pain	< 6 months	58	32.2
	≥ 6 months	122	67.8
Type of pain	Acute	52	28.9
	Chronic	128	71.1

Table 2: Distribution of Musculoskeletal Conditions among Participants (n = 180).

Condition	Number (n)	Percentage (%)
Cervical spondylosis	36	20
Low back pain	42	23.3
Frozen shoulder	28	15.6
Knee osteoarthritis	34	18.9
Sciatic pain	24	13.3
Rheumatoid arthritis	10	5.6
Gout	6	3.3

Distribution of Musculoskeletal Conditions

The distribution of musculoskeletal diagnoses is summarized in Table 2. Low back pain (23.3%) was the most frequently reported condition, followed by cervical

Md Hossain B, et al., Arch Physiother Rehabil 2026
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spondylosis (20.0%) and knee osteoarthritis (18.9%). Frozen shoulder and sciatic pain accounted for 15.6% and 13.3%, respectively. Inflammatory conditions such as rheumatoid arthritis (5.6%) and gout (3.3%) were comparatively less prevalent. Overall, degenerative and mechanical disorders constitute most cases among patients seeking wet cupping therapy.

Effect of Wet Cupping on Pain Severity and Functional Outcomes

Changes in pain severity and functional outcomes following wet cupping therapy are shown in Table 3. After 28 days, a statistically significant reduction in pain intensity was observed across all musculoskeletal conditions assessed using the Visual Analogue Scale (VAS). Mean VAS scores decreased significantly in patients with cervical spondylosis, low back pain, frozen shoulder, and sciatic pain (all $p < 0.001$). In patients with knee osteoarthritis, functional status improved markedly, with KOOS scores increasing from 48.2 ± 4.1 at baseline to 66.8 ± 3.2 at follow-up ($p < 0.001$). These findings demonstrate substantial clinical improvement in both pain severity and functional performance following wet cupping therapy.

Table 3: Effect of Wet Cupping Therapy on Pain and Functional Scores.

Condition	Assessment Tool	Baseline (Mean ± SD)	28th Day (Mean ± SD)	p-value
Cervical spondylosis	VAS	7.8 ± 0.9	3.9 ± 0.8	<0.001
Low back pain	VAS	7.6 ± 0.8	4.0 ± 0.7	<0.001
Frozen shoulder	VAS	7.7 ± 0.7	3.8 ± 0.6	<0.001
Sciatic pain	VAS	8.1 ± 0.6	4.1 ± 0.8	<0.001
Knee osteoarthritis	KOOS	48.2 ± 4.1	66.8 ± 3.2	<0.001

This figure 1 visually demonstrates the significant reduction in mean VAS scores for cervical spondylosis, low back pain, frozen shoulder, and sciatic pain, along with the marked improvement in KOOS scores for knee osteoarthritis from baseline to 28 days. The consistent downward trend in pain scores and upward trend in functional scores supports the clinical effectiveness of wet cupping therapy ($p < 0.001$ for all).

Changes in Inflammatory Markers

Inflammatory marker profiles before and after intervention are presented in Table 4. Mean CRP levels declined significantly from 3.6 ± 1.1 mg/L at baseline to 2.7 ± 0.9 mg/L on day 28 ($p < 0.001$). Similarly, ESR values decreased significantly from 29.4 ± 8.2 mm/hr to 21.6 ± 7.1 mm/hr ($p < 0.001$). Although serum uric acid levels showed a modest reduction, the change was not statistically significant ($p = 0.08$). Overall, wet cupping therapy was associated with a meaningful reduction in systemic inflammatory markers.

This figure 2 illustrates the significant decline in CRP and ESR levels following 28 days of wet cupping therapy. The reduction in both inflammatory markers indicates a systemic anti-inflammatory effect, supporting the mechanistic link between inflammation reduction and pain improvement ($p < 0.001$).

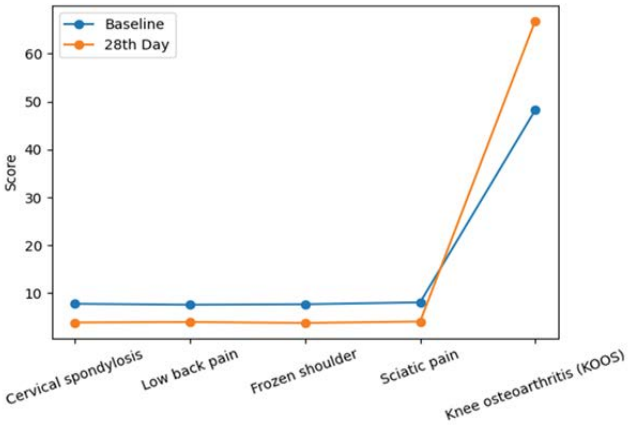

Figure 1: Changes in Pain Severity and Functional Scores.

Table 4: Pre- and Post-Treatment Inflammatory Markers (n = 180).

Marker	Baseline (Mean ± SD)	28th Day (Mean ± SD)	p-value
CRP (mg/L)	3.6 ± 1.1	2.7 ± 0.9	<0.001
ESR (mm/hr)	29.4 ± 8.2	21.6 ± 7.1	<0.001
Serum uric acid (mg/dL)	5.8 ± 1.0	5.6 ± 0.9	0.08

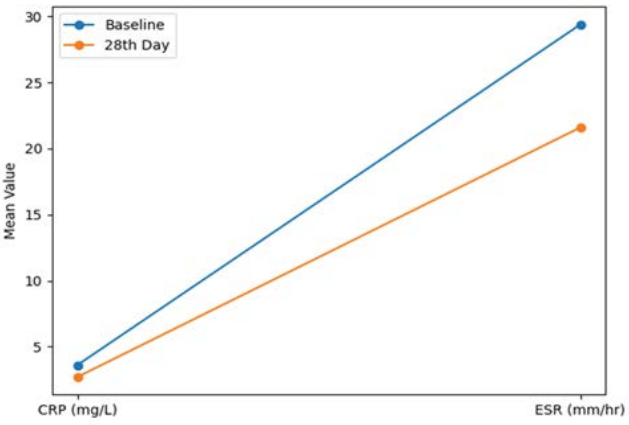

Figure 2: Changes in Inflammatory Markers Before and After Wet Cupping Therapy.

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Md Hossain B, et al., Arch Physiother Rehabil 2026
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Table 5: Biochemical Safety Parameters Before and After Wet Cupping Therapy

Parameter	Baseline (Mean ± SD)	28th Day (Mean ± SD)	p-value
ALT (U/L)	42.5 ± 11.8	39.2 ± 10.6	0.03
AST (U/L)	38.7 ± 9.6	35.1 ± 8.8	0.02
ALP (U/L)	128.4 ± 32.6	121.7 ± 30.9	0.04
Hemoglobin (g/dL)	13.2 ± 1.4	13.1 ± 1.3	0.41

Biochemical Safety Parameters

Changes in biochemical safety parameters are summarized in Table 5. Mild but statistically significant reductions were observed in liver enzyme levels, including ALT, AST, and ALP ($p < 0.05$ for all). Hemoglobin levels remained stable throughout the study period ($p = 0.41$). Importantly, no clinically significant adverse biochemical changes were detected, supporting the safety and tolerability of wet cupping therapy.

Mean biochemical parameters (ALT, AST, ALP, and hemoglobin) measured at baseline and 28 days following wet cupping therapy. Liver enzyme levels showed mild but statistically significant reductions, while hemoglobin levels remained stable, indicating good biochemical safety and tolerability of the intervention (Figure 3).

Table 6: Predictors of Pain Reduction Following Wet Cupping Therapy.

Predictor	β coefficient	95% CI	p-value
Age	0.02	0.01 – 0.04	0.01
Gender (Male)	0.31	0.12 – 0.49	0.002
Baseline CRP	0.44	0.26 – 0.63	<0.001
Duration of pain	0.38	0.19 – 0.56	<0.001

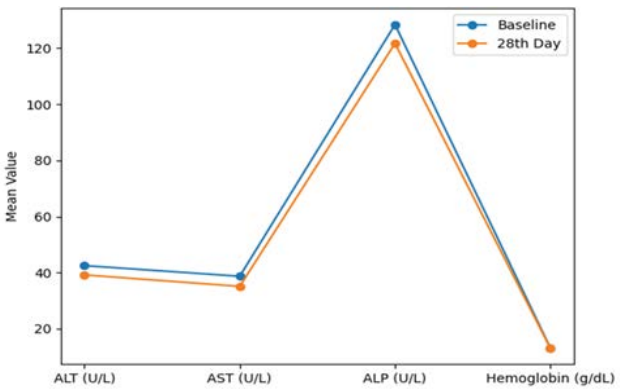

Figure 3: Changes in Biochemical Safety Parameters After Wet Cupping Therapy.

Predictors of Pain Reduction

Multivariable linear regression analysis identifying predictors of pain reduction is presented in Table 6. Higher baseline CRP levels ($\beta = 0.44$, $p < 0.001$) and longer duration of pain ($\beta = 0.38$, $p < 0.001$) emerged as the strongest independent predictors of greater pain reduction following wet cupping therapy. Male gender ($\beta = 0.31$, $p = 0.002$) and increasing age ($\beta = 0.02$, $p = 0.01$) were also significantly associated with improved pain outcomes. These results suggest that baseline inflammatory burden and chronicity of pain substantially influence therapeutic response.

Discussion

The demographic profile of the study population demonstrated a predominance of middle-aged adults, with 40.0% of participants aged 31–45 years and 33.3% aged 46–60 years, reflecting the age groups most affected by musculoskeletal disorders. Additionally, 67.8% of patients reported pain duration of ≥6 months, and 71.1% presented chronic pain, highlighting the substantial burden of long-standing musculoskeletal conditions. These findings are consistent with global epidemiological data showing that musculoskeletal disorders peak during productive working ages due to cumulative occupational exposure, sedentary behavior, and degenerative changes [10]. The slight male predominance (57.8%) observed may reflect occupational risk patterns and healthcare-seeking behaviors in the local population. A key finding of this study was the statistically and clinically significant reduction in pain severity following wet cupping therapy across all evaluated musculoskeletal conditions. Mean VAS scores decreased markedly in cervical spondylosis (7.8 ± 0.9 to 3.9 ± 0.8), low back pain (7.6 ± 0.8 to 4.0 ± 0.7), frozen shoulder (7.7 ± 0.7 to 3.8 ± 0.6), and sciatic pain (8.1 ± 0.6 to 4.1 ± 0.8), with $p < 0.001$ for all comparisons. These reductions represent clinically meaningful pain improvement rather than mere statistical significance. Furthermore, patients with knee osteoarthritis demonstrated substantial functional improvement, with KOOS scores increasing from 48.2 ± 4.1 at baseline to 66.8 ± 3.2 at 28 days ($p < 0.001$), indicating enhanced mobility and joint-related quality of life. These findings align with prior clinical studies reporting analgesic and functional benefits of wet cupping in musculoskeletal disorders [11]. The consistency of therapeutic response across multiple musculoskeletal conditions—degenerative, mechanical, and inflammatory, suggests that wet cupping may exert a generalized analgesic effect rather than being condition-specific. Proposed mechanisms include enhanced local microcirculation, mechanical removal of inflammatory mediators, and modulation of nociceptive pathways. The negative pressure and superficial scarification associated with wet cupping may stimulate endogenous pain inhibitory systems and improve tissue oxygenation, thereby

Md Hossain B, et al., Arch Physiother Rehabil 2026
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reducing pain perception and improving function [12]. The pronounced functional gains observed in knee osteoarthritis further support the role of wet cupping in addressing disability in chronic joint disorders. Another important observation was the significant reduction in systemic inflammatory markers following therapy. Mean CRP levels decreased from 3.6 ± 1.1 mg/L to 2.7 ± 0.9 mg/L, and ESR values declined from 29.4 ± 8.2 mm/hr to 21.6 ± 7.1 mm/hr, both with $p < 0.001$. These findings indicate a measurable anti-inflammatory effect of wet cupping therapy. Chronic low-grade inflammation is known to play a central role in musculoskeletal pain by promoting peripheral sensitization and sustained nociceptive signaling (1). The reduction in inflammatory markers observed in this study provides biological plausibility for the observed pain relief. Although serum uric acid levels showed a modest decline (5.8 ± 1.0 to 5.6 ± 0.9 mg/dL), the change was not statistically significant ($p = 0.08$), likely reflecting the relatively small proportion of gout patients (3.3%) in the study cohort. Safety assessment demonstrated a favorable biochemical profile following wet cupping therapy. Mild but statistically significant reductions were observed in ALT (42.5 ± 11.8 to 39.2 ± 10.6 U/L), AST (38.7 ± 9.6 to 35.1 ± 8.8 U/L), and ALP (128.4 ± 32.6 to 121.7 ± 30.9 U/L), while hemoglobin levels remained stable (13.2 ± 1.4 to 13.1 ± 1.3 g/dL; $p = 0.41$). Importantly, no clinically significant adverse biochemical changes were detected, supporting the safety and tolerability of wet cupping therapy. These findings are consistent with previous studies reporting the safety of wet cupping when performed under standardized and hygienic conditions [13]. The multivariable regression analysis provided further insight into predictors of therapeutic response. Higher baseline CRP levels ($\beta = 0.44$, $p < 0.001$) and longer duration of pain ($\beta = 0.38$, $p < 0.001$) emerged as the strongest independent predictors of pain reduction. This suggests that patients with greater inflammatory burden and chronic pain may derive more pronounced benefit from wet cupping therapy. Male gender ($\beta = 0.31$, $p = 0.002$) and increasing age ($\beta = 0.02$, $p = 0.01$) were also independently associated with improved outcomes, potentially reflecting differences in pain thresholds, inflammatory responses, or occupational exposure. These findings have important clinical implications for patient selection and individualized pain management strategies. Despite its strengths, this study has certain limitations. The absence of a control or shame-treated group limits causal inference, and the 28-day follow-up period does not allow assessment of long-term sustainability of benefits. Additionally, specific inflammatory cytokines and oxidative stress markers were not measured, which could have provided deeper mechanistic insights. Nonetheless, the study's strengths include a robust sample size, comprehensive assessment of clinical and laboratory outcomes, and integration of regression-based predictive analysis, enhancing its relevance to clinical practice.

Conclusion

This study demonstrates that wet cupping (Hijama) is an effective and safe non-pharmacological intervention for musculoskeletal pain. Significant improvements were observed in pain severity, functional outcomes, and systemic inflammatory markers, without clinically relevant adverse biochemical effects. The findings suggest that wet cupping may be particularly beneficial in patients with chronic, inflammation-driven musculoskeletal pain and support its potential role as an adjunctive therapy in integrative pain management.

Limitations

This study has several limitations. The absence of a control or shame-treated group limits causal inference. The relatively short follow-up period precludes evaluation of long-term efficacy and sustainability of treatment benefits. Additionally, inflammatory cytokines and oxidative stress markers were not assessed, which may have provided further mechanistic insight.

Conflict of Interest

The authors declare no conflict of interest related to this study.

Author Contributions

Md Balal Hossain: Conceptualization, study design, supervision, and final approval of the manuscript.

Md Noman Azam: Data analysis, statistical analysis, interpretation of results, and manuscript drafting.

Sonya Ghosh: Statistical support, data interpretation, and critical revision of the manuscript.

Musomi Khandaker: Manuscript writing, literature review, and formatting according to journal guidelines.

Most. Raihanul Jannat Roshni: Data collection, data entry, and preliminary data management.

Md Samiul Bashir: Study coordination, methodology support, critical revision of the manuscript, and corresponding author responsibilities

All authors have read and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

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