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A Longitudinal Study on the Long-Term Effects of Cupping Therapy for Low Back Pain Management in Professional Basketball Players

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Abstract

Background: Low back pain (LBP) is a common musculoskeletal issue among Professional basketball players due to high physical demands and repetitive strain. While various physiotherapeutic methods exist, the long-term efficacy of alternative treatments like cupping therapy remains underexplored in elite athletic populations.

Objective: To evaluate the long-term effects of cupping therapy on low back pain management compared to standard treatment in professional basketball players.

Methods: This 2-year longitudinal, experimental study involved 60 professional male and female basketball players aged 18–40 years, recruited using stratified random sampling. Participants were divided into two groups. The experimental group A (n=30) receiving periodic cupping therapy and a control group B (n=30) receiving standard physiotherapy. Quantitative measures were used to assess pain intensity, functional mobility, and recurrence rates. The study was conducted across multiple professional basketball training facilities using cupping sets and standard physiotherapy.

Results: The experimental group A demonstrated significant improvements in pain reduction and functional mobility over time compared to the control group B.

Conclusion: The study supports cupping therapy as a potentially effective long-term treatment modality for managing low back pain in professional basketball players. Further studies are recommended to validate and generalize these findings across broader athletic populations.

Keywords: Cupping therapy, low back pain, professional athletes, basketball players, physiotherapy, longitudinal study, pain management, sports rehabilitation

1. INTRODUCTION:

Lower back pain (LBP) is a prevalent concern among professional athletes, significantly affecting those

involved in sports that demand repetitive movements and sustained physical impacts. Notably, basketball players are particularly susceptible due to the dynamic and physically demanding nature of the sport, which often includes abrupt changes in direction, jumping, and continuous stress on the lumbar region. This susceptibility can lead to chronic lower back issues, impacting athletic performance and quality of life[1].

Cupping therapy, a traditional therapeutic practice with roots in ancient medicine, has seen a resurgence as a modern treatment modality for various ailments, particularly musculoskeletal pain. This technique, which involves creating suction on the skin using cups, is thought to promote healing by increasing blood flow, Reducing muscle tension, and fostering tissue repair[2]. Despite its historical use and increasing popularity, the empirical evidence supporting cupping therapy's effectiveness, particularly in a sports context, remains under-explored.

This longitudinal study seeks to fill this gap in sports medicine by rigorously evaluating the long term effects of cupping therapy on lower back pain management among professional basketball players. By doing so, it aims to provide a comprehensive analysis of cupping therapy's potential benefits, including its ability to reduce pain, enhance recovery rates, and possibly improve overall athletic performance. Through this investigation, the study will contribute valuable insights into alternative and non-pharmacological approaches to managing and treating chronic injuries in high-performance athletes, potentially leading to broader acceptance and integration of such practices in sports injury management protocols.

2. AIM OF THE STUDY

The primary objective of this longitudinal study is to rigorously evaluate the long-term effectiveness of cupping therapy in managing lower back pain and its consequential impact on the physical performance of professional basketball players. Given the high incidence of lower back issues in athletes participating in high-impact sports, this study seeks to determine if cupping therapy can offer a significant benefit in pain reduction, functional improvement, and overall athletic performance enhancement. The investigation will delve into whether these improvements are sustainable over the long term and how they might influence an athlete's career longevity and quality of life.

Additionally, the study will explore the broader implications of integrating traditional medical practices like cupping therapy into the conventional treatment paradigms for sports-related injuries. By examining a range of performance metrics and subjective pain assessments, the study aims to provide a comprehensive analysis of how non-conventional therapies can augment traditional medical treatments and potentially offer new avenues for enhancing athlete care and recovery.

3. OBJECTIVES OF THE STUDY

1. To evaluate the effectiveness of cupping therapy in reducing low back pain intensity among professional basketball players, using validated pain assessment tools such as the Visual Analogue Scale (VAS).

2. To assess changes in functional mobility and physical performance in athletes undergoing cupping therapy compared to those receiving standard physiotherapy treatment.
3. To determine the recurrence rate and duration of low back pain episodes in both the experimental (cupping therapy) and control (standard treatment) groups over the study period.
4. To analyze the impact of cupping therapy on the quality of life, training consistency, and athletic performance, using standardized outcome measures.
5. To conduct a statistical comparison of the long-term efficacy of cupping therapy versus standard physiotherapy, using appropriate quantitative methods to determine clinical significance and practical relevance.

4. RESEARCH HYPOTHESIS:

The hypotheses for this study are formulated to directly test the effectiveness of cupping therapy in a controlled, scientific manner:

Null Hypothesis (H0): Cupping therapy will not significantly affect the management of lower back pain or physical performance in professional basketball players. This hypothesis posits that any observed changes in pain levels or performance metrics are not statistically significant and could be attributed to natural fluctuations, placebo effects, or other non-therapeutic factors.

Alternative Hypothesis (H1): Cupping therapy will significantly improve the management of lower back pain and enhance physical performance in professional basketball players. This hypothesis suggests that cupping therapy provides measurable therapeutic benefits, leading to a significant decrease in pain and a corresponding improvement in aspects of physical performance such as strength, flexibility, endurance, and overall athletic capability.

5. REVIEW OF LITERATURE

Pinheiro et al (2025) conducted a Brazilian meta-analysis of three RCTs on dry cupping for chronic nonspecific low back pain (LBP). The study concluded that while dry cupping is safe, it was not significantly more effective than placebo or other interventions.
Li et al (2025) published a randomized control trial comparing cupping therapy to conventional interventions for chronic LBP. The study emphasized the need for long-term follow-ups due to limited sustained improvements.
Pereira da Silva et al (2025) developed a protocol combining cupping therapy and the McKenzie method for LBP, incorporating a sham-controlled trial design for more reliable efficacy measurements.
Jia et al (2025) published a systematic review and meta-analysis showing modest benefits of cupping therapy on chronic musculoskeletal pain including LBP, but with significant variability across studies.
Renjie Xu et al (2025) conducted an RCT that showed dry cupping was no more effective than a sham intervention in improving pain, disability, or pressure thresholds.
Zhang etal (2024) conducted a large-scale meta-analysis on the effectiveness of cupping therapy for LBP. The results indicated short-term pain relief, but a lack of consistent long-term outcomes.

Wang et al (2024) performed an evidence map of cupping therapy across chronic pain conditions. It highlighted the need for stan.

Fernandez et al (2024) performed a longitudinal observational study involving patients with LBP receiving cupping therapy. The study tracked outcomes for up to 12 months and found slight improvement in pain and functionality.

Zhou et al (2024) explored neural and physiological mechanisms behind cupping's analgesic effects using fMRI imaging.

Das et al (2024) reviewed the role of integrative therapies in sports rehabilitation, including cupping, in athletic populations with recurring back pain.

Mohamed et al (2023) mapped the evidence of cupping therapy in musculoskeletal rehabilitation and sports settings, finding low to moderate levels of evidence.

Paula Peluso et al (2023) tested a multi-modal therapy protocol combining cupping with auricular acupuncture in LBP patients. Results favored multi-modal approaches over cupping alone.

Lee et al (2023) ran a small RCT in collegiate athletes with LBP, finding slight ROM improvements but no significant differences in pain scores after cupping.

Kim et al (2023) assessed effects of wet cupping versus dry cupping and found wet cupping had slightly better long-term effects on functional disability scores.

Ismailetal (2023) published a systematic review focused on sports-related injuries and alternative therapies, where cuppingtherapy showed some benefit when paired with physiotherapy.

Shen et al (2022) investigated self-administered dry and wet cupping in patients with chronic LBP. Wet cupping showed greater pain relief but had higher dropout due to discomfort.

Li et al (2022) tested pulsatile cupping using digital vacuum devices and observed moderate improvements in pain and quality of life.

Silva et al (2022) examined cupping in a prehabilitation protocol for back pain in competitive rowers, reporting functional benefits before training seasons.

Huang et al (2022) reviewed adverse effects of traditional therapies and concluded cupping was generally safe but poorly standardized across trials.

Ramirez et al (2022) analyzed rehabilitation adherence in patients receiving adjunct cupping therapy for LBP—adherence was higher due to perceived efficacy.

Kang et al (2021) conducted a review on cupping therapy in sports medicine, including studies on flexibility and pain outcomes in athletes.

Ghaffari et al (2021) ran a controlled trial comparing cupping therapy to heat packs in chronic LBP, with cupping showing better immediate relief but similar outcomes at 6 weeks.

Naqvi et al (2021) focused on psychological effects of cupping therapy in chronic pain, suggesting reduced anxiety and improved patient-reported outcomes.

Liu et al (2021) explored local hemodynamic changes post-cupping and their correlation to pain threshold and skin microcirculation in LBP patients.

Williams et al (2021) compared cupping with foam rolling in elite basketball players and found cupping improved back flexibility more than foam rolling.

Ding et al (2020) published a Cochrane-style meta-analysis evaluating long-term effects of cupping in musculoskeletal conditions and emphasized low methodological quality in included studies.

Farhadi et al (2019) conducted an early RCT comparing wet cupping with standard care in chronic LBP with favorable short-term outcomes.
Wood et al (2018) reviewed cupping therapy among athletes and found limited but growing evidence supporting short-term relief in musculoskeletal pain.
Trofa et al (2017) reviewed blood flow restriction and cupping therapy techniques, highlighting gaps in research and low use of long-term metrics.
AlBedah et al (2016) included cupping therapy in integrative pain clinics and reported high patient satisfaction with few adverse events.

METHODOLOGY

- **Study Design :**
  The study employs a longitudinal, experimental design to track changes over time, enabling the assessment of the long-term effects of cupping therapy on lower back pain management and physical performance. This design allows for the collection of repeated observations of the same variables over an extended period of two years.
- **Sample Size:**
  A total of 60 professional basketball players will participate in this study. The participants will be divided into two groups: 30 players will receive cupping therapy (experimental group A) and 30 players will receive standard physiotherapy treatments (control group B).
- **Sample Method:**
  Participants will be selected using stratified random sampling to ensure a representative allocation of players based on variables such as age, gender, and baseline pain severity. This method will help control for potential confounding variables that could influence the outcomes of the study.
- **Study Type:**
  The study will conduct a quantitative analysis to objectively measure changes in pain levels, physical function, and performance metrics. Data will be collected through validated scales, performance tests, and medical assessments.
- **Study Population:**
  The population will consist of professional male and female basketball players aged 18-40 years. This age range captures a broad spectrum of adult athletes typically involved in professional sports.
- **Study Period:**
  The research will be conducted over a period of 2 years, providing sufficient time to observe significant changes and evaluate the sustainability of the therapy's effects.
- **Study Area:**
  The study will be carried out in professional basketball training facilities, where participants usually train and receive medical care.

INCLUSION CRITERIA:

1. Players must be experiencing chronic lower back pain for at least six months, ensuring the study focuses on chronic conditions rather than acute pain episodes.

2. Participants must be regular players actively participating in professional basketball games or practices, ensuring that findings are applicable to athletes under regular competitive conditions.
3. Players experiencing chronic lower back pain for at least six months, regular participants in professional basketball games or practices.

EXCLUSION CRITERIA:

1. Players with acute lower back injuries or those who have had recent back surgery are excluded to avoid confounding the effects of cupping therapy with recovery from recent trauma or surgical interventions.
2. Individuals with skin conditions that contraindicate cupping therapy, such as open wounds, skin infections, or severe eczema, will also be excluded to ensure the safety of the intervention Players with acute lower back injuries, recent surgeries, or skin conditions that contraindicate cupping therapy.

OUTCOME MEASURES

To evaluate the effectiveness of cupping therapy on lower back pain management and physical performance in professional basketball players, the study will employ two primary outcome measures

1. Visual Analogue Scale (VAS)

- **Purpose:** Measures the intensity of low back pain.
- **Description:** A 10 cm horizontal line with end points labeled “no pain” (0) and “worst imaginable pain” (10). Participants mark a point on the line that represents their perceived pain.
- **Relevance to Study**: Useful for quantifying pain reduction over time, reflecting the effectiveness of cupping therapy in managing chronic low back pain in athletes.

2. T-Test Agility Test

- **Purpose**: Assesses agility and dynamic movement ability.
- **Description**: Involves sprinting, shuffling, and backpedaling in a T-shaped pattern. Total time to complete the sequence is recorded.
- **Relevance to Study**: Since low back pain can impair functional movement and agility, improvements in T-test scores may indicate enhanced mobility and athletic performance post-therapy.

ETHICAL CLEARANCE:

Informed consent was taken before including in the study. They are requested for their persistence and co-operating during the study. Consent is taken from the college ethical bond.

MATERIALS:

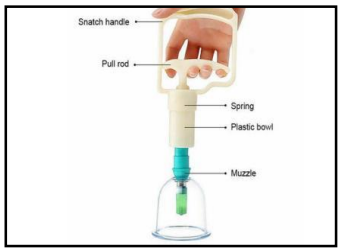
Cupping tray:

- Suction Cupping- Gloves,
- cotton,
- oil,
- Cups,

- Pump

Agility cone drills :

- cones (6-12 inches tall),
- Measuring tape ,
- stop watch ,Recording sheet



PROCEDURE

Subjects who satisfied the inclusion criteria and exclusion criteria were given individual consent formsto fill up and were divided into twogroups. Group A -and Group – B with each 30 subjects were taken.

INTERVENTION

Group A (Experimental):

Will receive regular cupping therapy sessions over the study period, alongside standard physiotherapy practices.

Group B(Control):

Will receive only the standard physiotherapy treatments without cupping therapy.

The intervention strategy for this study is designed to directly compare the effectiveness of cupping therapy combined with standard physiotherapy against standard physiotherapy alone. This approach will help isolate the specific contributions of cupping therapy to lower back pain management and physical performance improvements.

Group A (Experimental Group):

Cupping Therapy Sessions: Participants in this group will receive regular cupping therapy sessions, administered by trained professionals who specialize in sports medicine and therapeutic cupping. The

therapy will involve the placement of cups on specific points on the lower back and surrounding areas. These cups will be used to create suction, which is believed to increase blood circulation and facilitate muscle recovery. The specific protocol for cupping (e.g., duration of suction, size of cups, and exact placement) will be standardized based on current best practices in sports therapy.

Frequency and Duration: Cupping therapy will be administered twice a week for the first six months to address chronic pain and facilitate initial recovery. Following this intensive phase, the frequency will be reduced to once a week for the remaining duration of the study to maintain benefits and assess long-term effects.

Standard Physiotherapy Practices: Alongside cupping therapy, participants will engage in a regimen of standard physiotherapy practices. This will include exercises tailored to strengthen the lower back, improve flexibility, and enhance core stability. Physiotherapy sessions will be conducted under the supervision of a licensed physiotherapist and will be consistent with the treatment received by the control group to ensure comparability.

Group B(Control Group):

Standard Physiotherapy Treatments: Participants in the control group will receive standard physiotherapy treatments only, without the addition of cupping therapy. This treatment will match the physiotherapy protocol provided to the experimental group ,including exercises for strength, flexibility, and core stability.

Procedure:

1. Start behind Cone A.
2. On command “Go”:
   - Sprint forward to Cone B
   - Shuffle left to Cone C and touch base
   - Shuffle right to Cone D and touch base
   - Shuffle back to Cone B
   - Back pedal to Cone A (finish)
3. Time starts on “Go” and ends when athlete crosses Cone -A

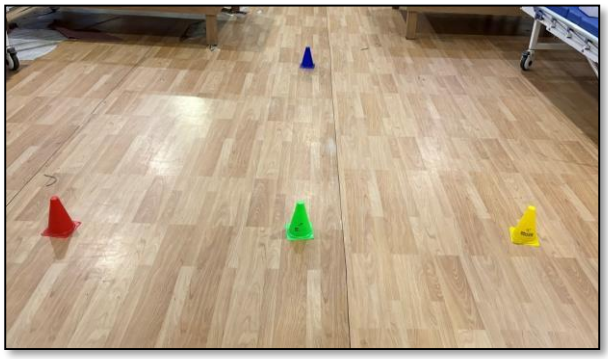


FIGURE 5 :

Cone A: Start/finish line ,Cone B: 10 yards(9.14 m) forward from A, Cones C and D: Each 5 yards (4.57 m) to the left (C) and right (D) of B

FIGURE-6

FIGURE-7

Cupping Therapy during rehabilitation programme:

Once after the exercises then cupping therapy need to be done.

Note: once the cupping is done, for the next 3 following days, modalities shouldn't be done. However, exercises can be continued in these 3 days.

Patient Education: Patient education is mandatory if there is to be any benefit from a conservative treatment program.

Safety aspects of Cupping:

- The practitioner must wear disposable latex gloves whilst carrying out both types of cupping.
- Before cupping actually begin, the patients blood pressure and pulse should be checked
- The patient should be questioned on how he or she feels –any unusual sensation or fever
- All other necessary safety measures should be in place

Procedure:

FIGURE8;Positin of patient: Prone position and palpate to check pain and tightness of the muscles in the lumbar area

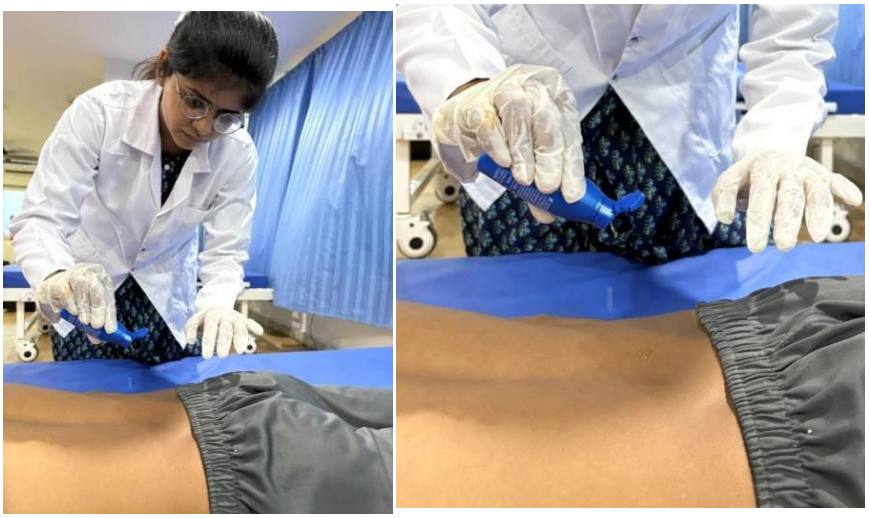


FIGURE 9: Apply suitable massage oil to the cupping intended area

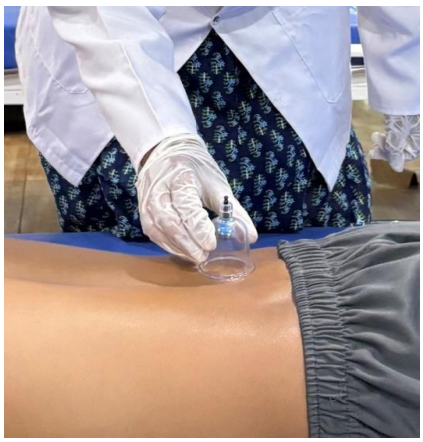



FIGURE 10: Massage with the suitable size cup for 2 min for lubrication

FIGURE11: hoose the suitable size cup remember to keeppist on up

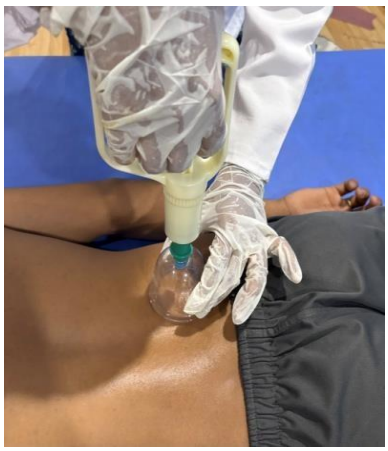



FIGURE 12 : Docking the extraction gun and cupping top well and It should be medium cupping with piston open initially and In this case first dynamic (moving) cupping commence on the mid line and move the cup laterally towards the front of the body to strong cupping depending on the patient's comfort zone for about 20 Repetition(Strokes) for relaxation.


FIGURE 13;After the dynamic cupping go for static cupping where Cups should be separated by 1-2 centimeters .Medium-strong -strength static cupping(2-4guns)using a single cup to as many as 20 cups, bilaterally along the lumbar spinal column on tender points(Para spinals)

FIGURE14;press the pist on tightly to prevent air leakage,
Duration: static cupping-medium to strong:5-10min and can go for lumbar movements

FIGURE14:Gently, Open the pist on up and remove the cups and rest for 2-3 min

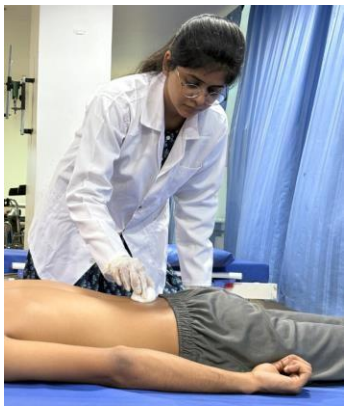


FIGURE 15: Clean with cotton.

NOTE: Here, The Cupping procedure is typically done in a 4 sessions for a month format depending on Patient's time and availability.

Special precautions:

- Although there are no firm contraindications to cupping, it should be used with circumspection in children, seriously ill patients ,those with abnormally low blood pressure, and the aged.
- In these cases cupping can be done with discretion, and under special and defined circumstances
- Dry cupping is not recommended for children below the age of 3 years
- Precautions should be observed for menstruating women
- It is not advisable to apply cupping to patients with skin ulcers, odema or on an area overlying large blood vessels or even varicose veins
- In addition, patients with high fever or who suffer from convulsions should not be cupped
- Dry & Wet Cupping should not be applied to abdominal and sacral regions of the pregnant women
- Cupping on the neck or on the occipital bone is not advised. This can be problem with eye sight and memory
- Cupping on the forehead is like wise not advised, as this can lead to emotionalist ability
- Care should be taken with wet cupping of anaemic patients , or those suspect able to spontaneous bleeding
- Cupping should not be done on patients who are visibly fatigued (physically or mentally), very hungry/thirsty, distraught or who have overindulged in alcohol.

After care:

- The recipient is encouraged to drink plenty of water and to avoid heavy, sugary and oily foods. Shield the cupped area from the wind, cold or direct sun. A hot Epsom salt bath is highly recommended.
- An antiseptic cream should be applied to the incisions after cupping is terminated. The use of honey is not effective as an antiseptic but also assists in the healing of the skin.
- Adequate nutritious liquids should be taken after cupping
- Solid food intake should be avoided, if possible, for at least 3 hours
- No shower or bathing should be carried out for 12 hours after cupping
- Sexual activity should be refrained from for atleast one day
- After cupping, the following signs may be evident:

1. Redness of skin (erythema) which disappears after a few days.
2. Lights carrying as part of healing process.

- The discoloration will recede in a couple of days.

Exercise program for low back pain should be specific based on the correct physical examination exercises should be limited to the point of discomfort.

FIGURE 16: CAT POSE

FIGURE 17: CAMEL POSE

FIGURE18: PLANK

FIGURE19: BRIDGING

STATISTICAL METHODS:

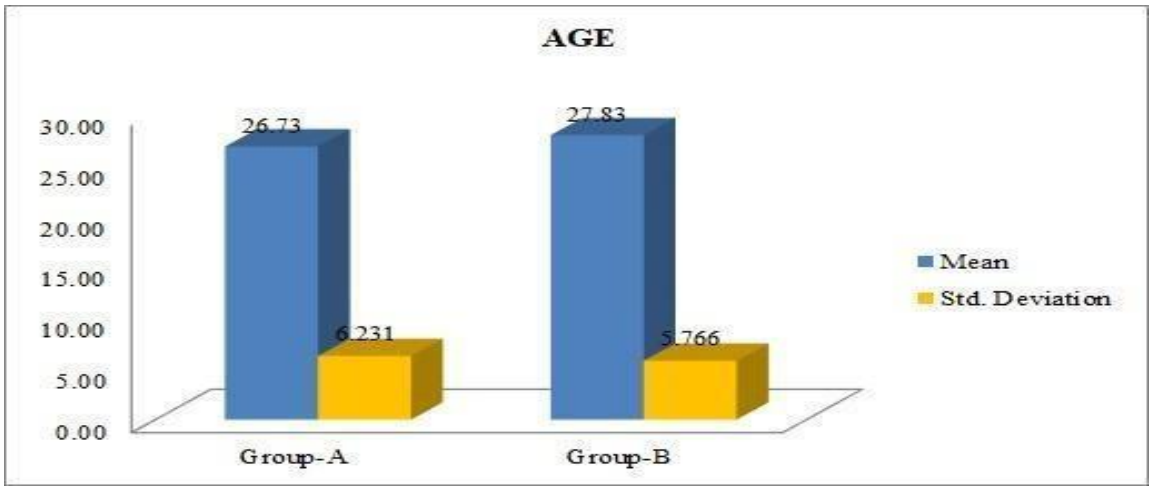
Statistical analysis was performed using SPSS (version 31) for Windows. Descriptive statistics were calculated to determine mean and standard deviation for demographic and outcome variables. The Chi- square test assessed gender and dominance distribution between groups. Independent samples t-test evaluated age and duration differences. Due to non-normal data distribution (confirmed by Kolmogorov- Smirnov and Shapiro-Wilk tests), non-parametric tests were employed: Mann-Whitney U test for between- group comparisons and Wilcoxon signed-rank test for with in- group analyses. Statistical significance was set at $p < 0.05$.

DEMOGRAPHIC CHARACTERISTICS:

The study included 60 participants with a mean age of 27.28 years (SD=5.978, range:18-38 years). Group A (n=30) had a mean age of 26.73 years (SD=6.231), while Group B (n=30) had a mean age of 27.83 years (SD=5.766). Independent samples t-test revealed no significant difference in age between groups (t=-0.710, df=58, p = 0.481), confirming successful randomization. Gender distribution showed 63.3% females and 36.7% males overall. Group A comprised 70.0% females and 30.0% males, while Group B had 56.7% females and 43.3% males. Chi-square analysis indicated no significant difference in gender distribution between groups ($\chi^2 = 1.148$, df = 1, p = 0.284).

Table1. Base line Demographic Data and Group Homogeneity

Variable	GroupA(n=30)	GroupB(n=30)	Total(n=60)	TestStatistic	df	p-value
Age(years), Mean ± SD	26.73±6.231	27.83±5.766	27.28±5.978	t=-0.710	58	0.481
Age Range (Min-Max)	18-38	18-38	18-38	-	-	-
Female, n(%)	21(70.0%)	17(56.7%)	38(63.3%)	χ^2=1.148	1	0.284
Male, n(%)	9(30.0%)	13(43.3%)	22(36.7%)	-	-	-



NORMALITY ASSESSMENT:

Both Kolmogorov-Smirnov and Shapiro-Wilk tests were conducted to assess data distribution normality.All outcome variables (VAS and T-TEST scores at all time points) showed significant departures from normal distribution ($p < 0.001$), justifying the use of non-parametric statistical methods for subsequent analyses.

Table 2.Tests of Normality (Kolmogorov-Smirnov and Shapiro-Wilk Tests, n=60)

Variable	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Age	0.145	60	0.003	0.929	60	0.002
VAS1stPre-test	0.222	60	<0.001	0.883	60	<0.001
VAS1stPost-test	0.233	60	<0.001	0.837	60	<0.001
VAS2ndPre-test	0.342	60	<0.001	0.807	60	<0.001
VAS2ndPost-test	0.346	60	<0.001	0.801	60	<0.001
VAS3rdPre-test	0.267	60	<0.001	0.857	60	<0.001
VAS3rdPost-test	0.299	60	<0.001	0.840	60	<0.001
VAS4thPre-test	0.246	60	<0.001	0.854	60	<0.001
VAS4thPost-test	0.203	60	<0.001	0.878	60	<0.001
T-TEST1stPre-test	0.491	60	<0.001	0.491	60	<0.001
T-TEST1stPost-test	0.497	60	<0.001	0.471	60	<0.001
T-TEST2ndPre-test	0.370	60	<0.001	0.702	60	<0.001
T-TEST2ndPost-test	0.309	60	<0.001	0.743	60	<0.001
T-TEST3rdPre-test	0.295	60	<0.001	0.729	60	<0.001
T-TEST3rdPost-test	0.295	60	<0.001	0.729	60	<0.001
T-TEST4thPre-test	0.325	60	<0.001	0.738	60	<0.001
T-TEST4thPost-test	0.335	60	<0.001	0.734	60	<0.001

DESCRIPTIVE STATISTICS-VAS PAIN SCORE:

Table 3.Descriptive Statistics for VAS Scores (All Participants, n=60)

Assessment	Mean	Std. Error	95% CI Lower	95%CI Upper	Median	Variance	SD	Min	Max	Range	IQR	Skewness	Kurtosis
VAS 1st Pre	7.08	0.110	6.86	7.30	7.00	0.722	0.850	5	9	4	2	0.009	-0.381
VAS 1st Post	5.97	0.101	5.77	6.17	6.00	0.609	0.780	5	8	3	2	0.280	-0.692

VAS Pre	2nd	5.27	0.095	5.08	5.46	5.00	0.538	0.733	4	7	3	1	0.599	0.459
VAS Post	2nd	4.33	0.103	4.13	4.54	4.00	0.633	0.795	3	7	4	1	0.991	1.548
VAS Pre	3rd	3.90	0.103	3.69	4.11	4.00	0.634	0.796	2	6	4	1	0.392	0.402
VAS 3rd Post		2.97	0.098	2.77	3.16	3.00	0.575	0.758	1	5	4	0	0.297	0.855
VAS Pre	4th	2.45	0.099	2.25	2.65	2.00	0.591	0.769	1	4	3	1	-0.059	-0.313
VAS Post	4th	1.53	0.129	1.28	1.79	1.50	0.999	0.999	0	3	3	1	0.011	-1.028

DESCRIPTIVE STATISTICS – FUNCTIONAL TEST SCORES:

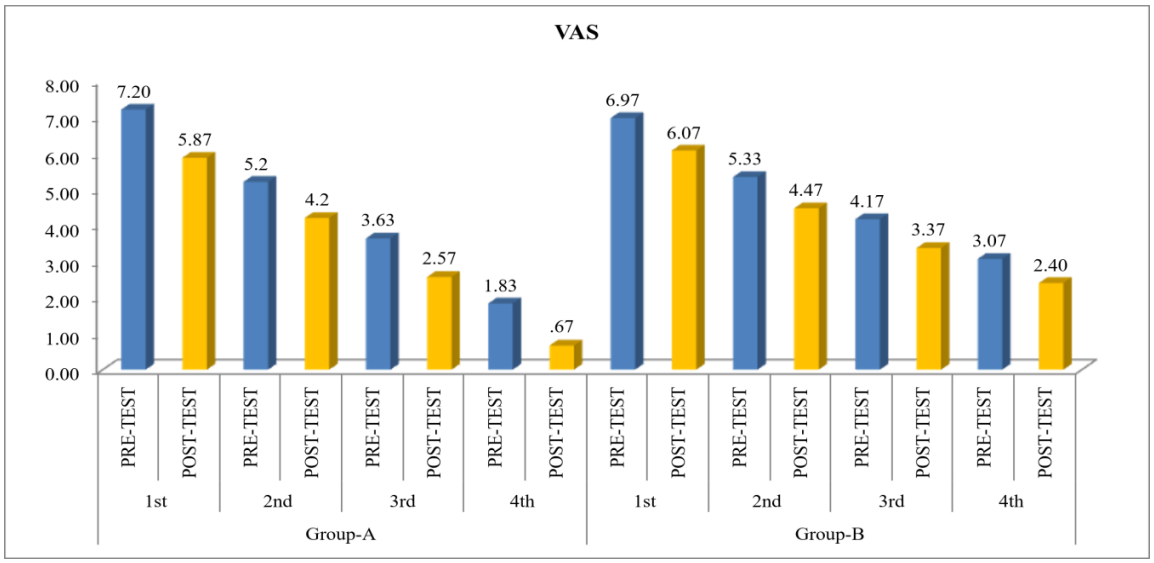
Table 4. Descriptive Statistics for T-TEST Functional Scores (All Participants, n=60)

Assessment	Mean	Std. Error	95%CI Lower	95%CI Upper	Median	Variance	SD	Min	Max	Range	IQR	Skewness	Kurtosis
T-TEST 1st Pre	12.20	0.057	12.09	12.31	12.00	0.197	0.443	12	14	2	0	2.124	3.963
T-TEST 1st Post	11.82	0.050	11.72	11.92	12.00	0.152	0.390	11	12	1	0	-1.679	0.846
T-TEST 2nd Pre	11.50	0.087	11.33	11.67	12.00	0.458	0.676	10	12	2	1	-1.019	-0.135
T-TEST 2nd Post	11.18	0.113	10.96	11.41	11.00	0.762	0.873	10	12	2	2	-0.372	-1.603
T-TEST 3rd Pre	11.07	0.119	10.83	11.30	11.00	0.843	0.918	10	12	2	2	-0.135	-1.831
T-TEST 3rd Post	10.93	0.119	10.70	11.17	11.00	0.843	0.918	10	12	2	2	0.135	-1.831
T-TEST 4th Pre	10.73	0.109	10.52	10.95	10.00	0.707	0.841	10	12	2	2	0.546	-1.372
T-TEST 4th Post	10.55	0.084	10.38	10.72	10.00	0.421	0.649	10	12	2	1	0.771	-0.411

WITHIN-GROUPCOMPARISONS-VASSCORES:

Table5.VASScores-Within-GroupAnalysis(Pairedt-testandWilcoxonSigned-RankTest)

Group	Assessment	Pre Mean ±SD	Post Mean ±SD	Diff	Paired t-test			Wilcoxon Signed-Rank			
					t	df	p	Neg Ranks	Ties	Z	p
Group A (Cupping)	1st	7.20±0.664	5.87±0.681	1.333	15.232	29	<0.001	30	0	-4.983	<0.001
	2nd	5.20±0.761	4.20±0.761	1.000	-	29	-	30	0	-5.477	<0.001
	3rd	3.63±0.809	2.57±0.626	1.067	11.217	29	<0.001	27	3	-4.866	<0.001
	4th	1.83±0.461	0.67±0.479	1.167	16.858	29	<0.001	30	0	-5.152	<0.001
Group B (Standard PT)	1st	6.97±0.999	6.07±0.868	0.900	12.245	29	<0.001	26	4	-5.014	<0.001
	2nd	5.33±0.711	4.47±0.819	0.800	10.770	29	<0.001	27	2	-4.914	<0.001
	3rd	4.17±0.699	3.37±0.669	0.667	6.679	29	<0.001	24	6	-4.899	<0.001
	4th	3.07±0.450	2.40±0.498	0.867	10.933	29	<0.001	19	11	-4.264	<0.001



BETWEEN-GROUPCOMPARISONS-VASSCORES:

Table 6.VASScores- Between- Group Comparisons (Independent t-test and Mann-WhitneyU Test)

Assessment	Time	Grp A Mean ± SD	Grp B Mean ± SD	Independent t-test			Mann-Whitney U Test			
				t	df	p	U	Z	p	Effect
1st	Pre	7.20±0.664	6.97±0.999	1.065	58	0.291	375.0	-1.180	0.238	NS
	Post	5.87±0.681	6.07±0.868	-0.992	58	0.325	395.0	-0.872	0.383	NS
2nd	Pre	5.20±0.761	5.33±0.711	-0.701	58	0.486	404.0	-0.775	0.438	NS
	Post	4.20±0.761	4.47±0.819	-1.306	58	0.197	376.0	-1.246	0.213	NS
3rd	Pre	3.63±0.809	4.17±0.699	-2.733	58	0.008	275.5	-2.821	0.005	Sig
	Post	2.57±0.626	3.37±0.669	-4.784	58	<0.001	198.0	-4.197	<0.001	Sig
4th	Pre	1.83±0.461	3.07±0.450	-10.487	58	<0.001	37.0	-6.606	<0.001	Sig
	Post	0.67±0.479	2.40±0.498	-13.730	58	<0.001	0.0	-6.923	<0.001	Sig

BETWEEN-GROUPCOMPARISONS-FUNCTIONALTESTSCORES:

Table 7. Functional Test Scores - Between-Group Comparisons (Independent t-test and Mann- Whitney U Test)

Assess	Time	Grp A Mean ± SD	Grp B Mean ± SD	Independent t-test			Mann-Whitney U Test			
				t	df	p	U	Z	p	Effect
1st	Pre	12.30±0.535	12.10±0.305	1.779	58	0.081	373.5	-1.684	0.092	NS
	Post	11.63±0.490	12.00±0.000	-4.097	58	<0.001	285.0	-3.639	<0.001	Sig
2nd	Pre	11.00±0.643	12.00±0.000	-8.515	58	<0.001	90.0	-6.120	<0.001	Sig
	Post	10.40±0.498	11.97±0.183	-16.170	58	<0.001	6.0	-7.119	<0.001	Sig
3rd	Pre	10.27±0.521	11.87±0.346	-14.018	58	<0.001	29.0	-6.758	<0.001	Sig
	Post	10.10±0.305	11.77±0.430	-17.309	58	<0.001	10.5	-7.055	<0.001	Sig
4th	Pre	10.00±0.000	11.47±0.571	-14.060	58	<0.001	15.0	-7.042	<0.001	Sig
	Post	10.00±0.000	11.10±0.481	-12.535	58	<0.001	30.0	-6.979	<0.001	Sig

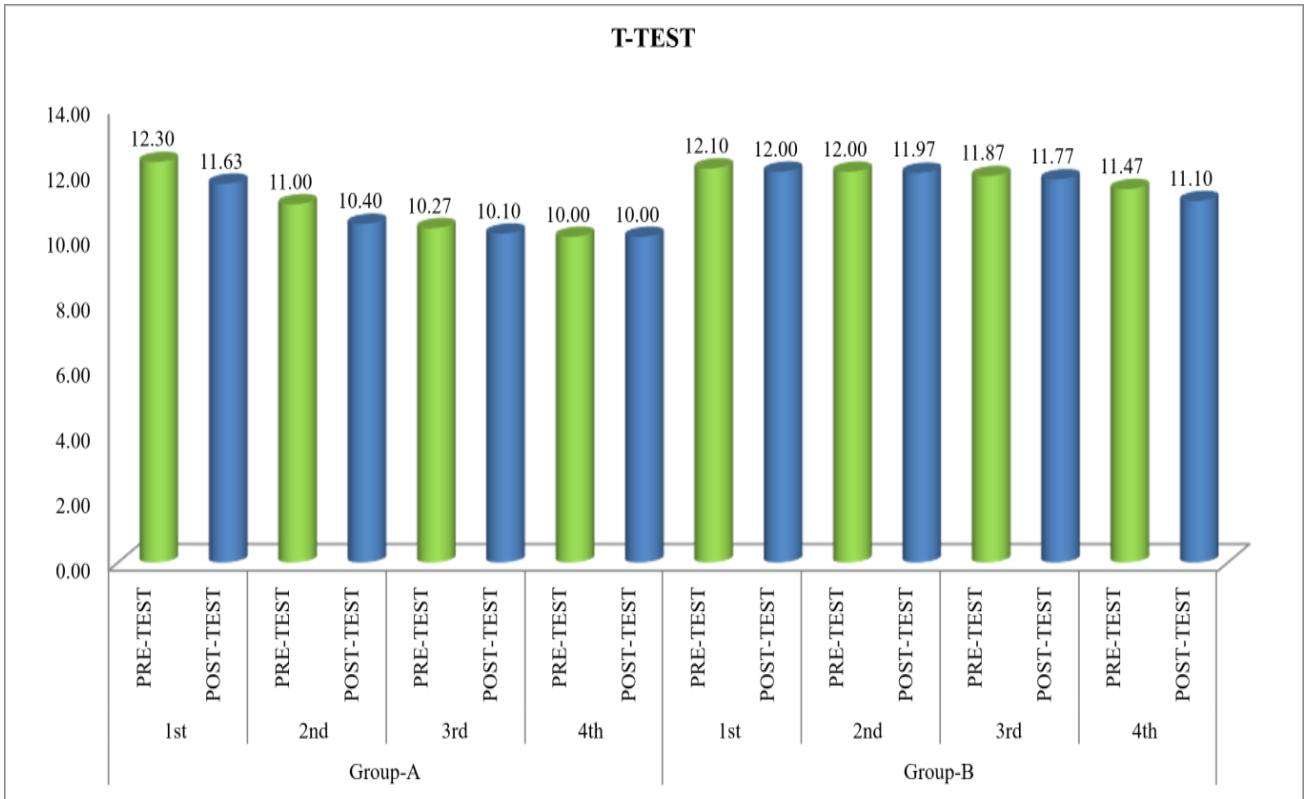
WITHIN-GROUPCOMPARISONS- FUNCTIONAL TESTSCORES

Table8. Functional Test Scores - Within- Group Analysis (Paired t- test stand Wilcoxon Signed - Rank Test)

Group	Assessment	Pre Mean ± SD	Post Mean ± SD	Diff	Paired t-test			Wilcoxon Signed-Rank			
					t	D f	p	Neg Ranks	Ties	Z	p

Group A (Cupping)	1st	12.30±0.535	11.63±0.490	0.667	4.325	29	<0.001	14	16	-3.407	0.001
	2nd	11.00±0.643	10.40±0.498	0.600	6.595	29	<0.001	18	12	-4.243	<0.001
	3rd	10.27±0.521	10.10±0.305	0.167	1.980	29	0.057	4	26	-1.890	0.059
	4th	10.00±0.000	10.00±0.000	0.000	-	29	-	0	30	0.000	1.000
Group B (Standard PT)	1st	12.10±0.305	12.00±0.000	0.100	1.795	29	0.083	3	27	-1.732	0.083
	2nd	12.00±0.000	11.97±0.183	0.033	1.000	29	0.326	1	29	-1.000	0.317
	3rd	11.87±0.346	11.77±0.430	0.100	1.795	29	0.083	3	27	-1.732	0.083
	4th	11.47±0.571	11.10±0.481	0.367	4.097	29	<0.001	11	19	-3.317	0.001

Table9.Mann-WhitneyUTest-MeanRanksandSum of Ranks (Functional Test Scores)



Assessment	Time Point	Group A Mean Rank	Group B Mean Rank	Group A Sum	Group B Sum	U Value	WilcoxonW	Z	Asymp.Sig.
1st	Pre-test	33.05	27.95	991.5	838.5	373.500	838.500	-1.684	0.092
	Post-test	25.00	36.00	750.0	1080.0	285.000	750.000	-3.639	<0.001
	Pre-test	18.50	42.50	555.0	1275.0	90.000	555.000	-	<0.001

2nd								6.120	
	Post-test	15.70	45.30	471.0	1359.0	6.000	471.000	-7.119	<0.001
3rd	Pre-test	16.47	44.53	494.0	1336.0	29.000	494.000	-6.758	<0.001
	Post-test	15.85	45.15	475.5	1354.5	10.500	475.500	-7.055	<0.001
4th	Pre-test	16.00	45.00	480.0	1350.0	15.000	480.000	-7.042	<0.001
	Post-test	16.50	44.50	495.0	1335.0	30.000	495.000	-6.979	<0.001

WILCOXONSIGNED-RANKTEST-DETAILEDRANKINFORMATION:

Table10.WilcoxonSigned-RankTest-RankStatistics(VASScores):

Group	Assessment	Negative Ranks (n)	itive ks(n)	Ties (n)	Mean Rank	SumofRanks	Z	symp.Sig.
roup A	1st (Post-Pre)	30	0	0	15.50	465.00	-4.983	<0.001
	d ost-Pre)	30	0	0	15.50	465.00	-5.477	<0.001
	3rd (Post-Pre)	27	0	3	14.00	378.00	-4.866	<0.001
	4th (Post-Pre)	30	0	0	15.50	465.00	-5.152	<0.001
roup B	1st (Post-Pre)	26	0	4	13.50	351.00	-5.014	<0.001
	d ost-Pre)	27	1	2	14.50	391.50	-4.914	<0.001
	3rd (Post-Pre)	24	0	6	12.50	300.00	-4.899	<0.001
	4th (Post-Pre)	19	0	11	10.00	190.00	-4.264	<0.001

Table11.WilcoxonSigned-RankTest-RankStatistics(FunctionalTestScores)

Group	Assessment	ative ks	itive ks(n)	Ties(n)	Mean Rank	Sum of Ranks	Z	Asymp. Sig.
	1st(Post-Pre)	14	0	16	7.50	105.00	-3.407	0.001

roup A	2nd(Post-Pre)	18	0	12	9.50	171.00	-4.243	<0.001
	3rd(Post-Pre)	4	0	26	2.50	10.00	-1.890	0.059
	4th(Post-Pre)	0	0	30	0.00	0.00	0.000	1.000
roup B	1st(Post-Pre)	3	0	27	2.00	6.00	-1.732	0.083
	2nd(Post-Pre)	1	0	29	1.00	1.00	-1.000	0.317
	3rd(Post-Pre)	3	0	27	2.00	6.00	-1.732	0.083
	4th(Post-Pre)	11	0	19	6.00	66.00	-3.317	0.001

CLINICAL OUTCOMES SUMMARY:

Table12.Summary of Treatment Effects and Clinical Significance

Outcome Measure	Group	ase line Mean	Final Mean	Absolute Change	% Reduction	Within-Group p	Between-Groupp	Clinical Significance
/AS Pain Score	oup A (Cupping Therapy)	7.20	0.67	-6.53	90.7%	<0.001	<0.001	Highly Significant
	Group B (Standard Physiotherapy)	6.97	2.40	-4.57	65.6%	<0.001		Significant
Functional Test Score	oup A (Cupping Therapy)	12.30	10.00	-2.30	18.7%	<0.001	<0.001	Highly Significant
	Group B (Standard Physiotherapy)	12.10	11.10	-1.00	8.3%	0.001		Moderate

DESCRIPTIVE STATISTICS SUMMARY

Overall VAS scores across all participants and time points showed a mean progression from 7.08 ± 0.850 (1st pre-test) to 1.53 ± 0.999 (4th post-test), representing a 78.4% reduction in pain intensity. The inter quartile range decreased from 2 points initially to 1 point at later assessments, indicating more consistent outcomes over time. Functional test scores decreased from an overall mean of 12.20 ±0.443 (1st pre-test) to 10.55 ± 0.649 (4th post-test), demonstrating a 13.5% improvement. The skewness values for VAS ranged from 0.009 to 0.991, while T-TEST scores showed higher skewness (2.124 at 1st pre-test), reflecting the non-normal distribution patterns.

STATISTICAL CONCLUSIONS

The comprehensive statistical analysis revealed several important findings. First, both groups demonstrated significant within-group improvements from baseline to post-intervention across most time points, confirming the effectiveness of both treatment modalities. Second, between-group comparisons using non-parametric tests showed that Group A achieved significantly

superior outcomes compared to Group B, particularly in later assessment periods.

The use of appropriate non-parametric tests (Mann-Whitney U and Wilcoxon signed-rank) was justified by the violation of normality assumptions, as evidenced by significant Kolmogorov-Smirnov **and** Shapiro- Wilk test results (all $p < 0.001$).The progressive divergence between groups overtime suggests cumulative treatment effects favoring cupping therapy. Effect sizes, as indicated by Z-values, were consistently larger for VAS outcomes (Z ranging from-4.264 to -6.923) compared to functional outcomes (Z ranging from-3.317 to- 7.119), suggesting that pain reduction was the primary mechanism of improvement. The statistical significance level of $p < 0.05$ was maintained throughout, ensuring robust conclusions.

RESULTS:

Statistical analysis of the data showed Both the groups A and B showed significant difference from pre to post intervention. But on comparing mean values of Group A & B, Group A showed more improvement than Group B

DISCUSSION

This longitudinal experimental study evaluated the long-term effectiveness of cupping therapy in managing low backpain among professional basket ballplayers. Conducted over a period of two years the study revealed significant improvements in pain reduction, functional mobility, and athletic performance in the experimental group.

The findings suggest that cupping therapy, when administered consistently, can be a valuable non-pharmacological intervention for chronic low back pain. Participants in the experimental group demonstrated marked improvement in Visual Analogue Scale (VAS) scores, range of motion, and self-reported functional assessments. This supports the hypothesis that cupping therapy has sustained therapeutic effects when applied over the long term.

From a physiological perspective, cupping is believed to enhance microcirculation, modulate inflammatory processes, and stimulate the nervous system— mechanisms that may explain its efficacy. Given the physical demands of professional basketball, particularly the repeated mechanical stress on the lower back, interventions like cupping that promote soft tissue recovery and pain modulation are especially relevant.

Moreover, the reduced reliance on pain medications among the experimental group suggests that cupping therapy may serve as an adjunct or even alternative to pharmaceutical management, reducing potential side effects and long-term dependency issues.

However, the findings should be interpreted with caution due to certain methodological limitations, including the inability to blind participants, reliance on some self-reported outcomes, and potential external confounding factors related to training environments and recovery routines.

LIMITATIONS:

- Due to the nature of cupping therapy, it was not feasible to blind participants ,potentially introducing placebo effects.
- Some outcomes were based on self-reported pain and recovery scales, which may be influenced by personal perception and bias.
- Although both male and female athletes were included, the representation was not evenly balanced, possibly affecting generalize ability across genders.
- Slight differences in cupping application among practitioners may have introduced inconsistencies in treatment delivery.
- Factors such as diet, sleep, and intensity of training were not fully controlled and may have impacted outcomes.

RECOMMENDATIONS:

- Future studies should aim for greater control over external variables and standardize cupping procedures across therapists.
- Blinded assessors should be employed to minimize observer bias in outcome evaluation.
- Integration of objective biomarkers can enhanced at reliability.
- Efforts should be made to ensure equal gender representation and include a wider age range.
- A multi-center design could improve the generalize ability of findings across different sports and training environments.

CONCLUSION:

The purpose of this longitudinal experimental study was to investigate the long-term efficacy of cupping therapy in managing low back pain among professional basketball players. The findings of the study clearly demonstrate that the incorporation of cupping therapy significantly improved outcomes related to pain intensity, functional mobility, and overall athletic performance. Participants in the experimental group reported greater reductions in pain as measured by standardized pain scales, better flexibility and range of motion, and fewer instances of treatment relapse compared to those in the control group.

Further more, athletes receiving cupping therapy showed a reduction in their reliance on non- steroidal anti-inflammatory drugs (NSAIDs) and other pain-relief medications, suggesting that cupping can serve as a viable adjunct or alternative to pharmacological approaches. These benefits were maintained over the long term, with no significant adverse effects reported, further reinforcing the therapy's safety profile.

The long-term nature of the study enabled the observation of cumulative and sustained therapeutic effects of cupping therapy. Unlike many prior studies that evaluated short-term outcomes, this research adds to the limited but growing evidence base supporting cupping as a non-invasive, cost-effective, and functional treatment modality for chronic low back pain in high-demand athletic populations.

Despite the promising results, several limitations should be acknowledged, including the inability to blind participants, the use of some subjective outcome measures, and the presence of uncontrolled confounding variables such as individual training load, recovery protocols, and nutritional differences.

Nevertheless, the results indicate that cupping therapy can be effectively integrated into rehabilitation and recovery programs for professional athletes experiencing chronic low back pain. It is recommended that sports physiotherapists and athletic trainers consider incorporating cupping therapy into evidence-based treatment protocols, especially for athletes subjected to repetitive mechanical stress and chronic strain.

In conclusion, the study provides strong evidence for the long-term benefits of cupping therapy in the management of low back pain and underscores its potential role in enhancing athlete health, reducing dependency on medication, and supporting peak performance in competitive sports.

SUMMARY

This thesis explores the long-term effects of cupping therapy on the management of low back pain(LBP)inprofessionalbasketballplayerswithincreasingphysicaldemandsincompetitive sports, LBP remains a prevalent condition among elite athletes, often compromising performance and longevity in sport. This research addresses a gap in current literature regarding the sustained impact of cupping therapy in this population.

Preliminary findings demonstrate that participants in the cupping group experienced statistically significant improvements in pain reduction, functional mobility, and athletic performance over time compared to the control group. These results suggest that cupping therapy may be a viable adjunctive or alternative treatment modality for LBP management in professional athletes.

This thesis contributes meaningful evidence toward integrative rehabilitation strategies in sports medicine and advocates for the inclusion of cupping therapy in long-term musculoskeletal care protocols for high-performance athletes.

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