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**Faculty of Graduate Studies**

**The effect of dry cupping on delayed onset muscle soreness and  
shoulder joint flexibility among healthy bodybuilders: A quasi-  
experimental study**

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**This thesis was submitted in partial fulfillment of the requirements for**

**the Master`s degree in**

**Physiotherapy**

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## Thesis approval

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## Declaration

I, the undersigned, the author of Master thesis entitled as “The effect of dry cupping on delayed onset muscle soreness and shoulder joint flexibility among healthy bodybuilders: A quasi-experimental study ” which is submitted to the Arab American University for the Master’s degree and I declare that it is the result of my own research, except as indicated, of which none has been offered for a higher degree to any university or other educational institution.

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26/4/2024

Signature *Ahmed Eleyat*

## Dedication

I have the honor to dedicate this thesis to:

*Dr. Motaz Alawneh*

For his countless hours of reflecting, reading, encouragement, and patience throughout the entire process, I will always appreciate all you have done.

*Our family*

A special feeling of gratitude to my lovely family, thank you for supporting and encouraging me throughout the process.

## **Acknowledgment**

I would like to express my sincere gratitude to God for completing my thesis successfully, as the master's journey was wonderful despite all the circumstances and pressures of study, and it also constituted a qualitative leap from the scientific point of view. I also extend my thanks and gratitude to my distinguished supervisor, Dr. Moataz Alawneh, who was with me step by step during this stage. I also thank everyone who taught me during this period for their continuous support and encouragement

## Abstract

**Background:** Delayed onset muscle soreness (DOMS) is an unavoidable outcome of exercise and physical activity for athletes, it is also one of the most important problems facing bodybuilders, due to exposure to muscle tension after exercising with high weights. Dry cupping could have a beneficial effect on delayed muscle soreness and shoulder joint.

**Objective:** This study investigated the effect of dry cupping on reducing delayed muscle soreness and improving shoulder joint flexibility to understand how they relate to creating and maintaining a healthy lifestyle and preventing injuries among bodybuilders.

**Methods:** a quantitative/quasi-experimental study induced 40 participants physically fit and healthy (all males; aged between 20-40), and completed an exercise protocol to induce delayed onset muscle soreness and a decrease in shoulder flexibility.

**Intervention:** A 7-minute and one-time session dry cupping treatment was performed on each participant on the trapezius (UT, MT, LT) and deltoid (AD, MD, PD) muscles after identifying trigger points after each group had undergone a pre-test and post-test after 48-72 hours.

**Primary outcome measures:** Each participant underwent a pre-test in which we measured delayed muscle soreness with a pain pressure threshold device, and shoulder range of motion through shoulder flexibility test and we measured pain intensity through visual analog scale (VAS).

**Results:** dry cupping increases the flexibility of the shoulder joint by increasing (C7) in the dominant part, as it reached (C7) in the pre-test (7.43) versus (9.70) in the post-test, and the difference was in favor of the post-test, this means that an increase in (C7) of the dominant part leads to increased flexibility of the shoulder joint. Cohen's d value was (1.91), which means that dry cupping has a significant effect in increasing the flexibility of the shoulder joint, also there are no differences that are statistically significant on level (0.05) in the averages of the scores of the respondents before and after using dry cupping that decrease delayed muscle soreness due to the age. Where the value of statistical significance for M trap before using dry cupping was (0.130), which is greater than (0.05) and not statistically significant, and the value of statistical significance for M trap after using dry cupping was (0.103), which is greater than (0.05) and not statistically significant. This indicates that the change in M trap does not differ with different age levels.

**Conclusion:** Dry cupping may help decrease hypoxia and hemoglobin levels as well as boost hemoglobin levels. This enhances local oxygen intake and promotes blood microcirculation and circulatory activity. This could be related to the significant impact of sports cupping on the performance of bodybuilders. Dry cupping helps in increasing the efficiency of the small blood circulation, which increases the ability of red blood cells to carry more oxygen.

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## Abbreviations

Listed are some Abbreviations that were mentioned in our research and are considered universal:

DOMS = Delayed onset muscle soreness

ROM = Range of motion

WBV =Whole-body vibration

MTrPs = Myofascial Trigger points

VAS = Visual analogue scale

IRB = Institutional review boards

PPT measurements: Pain Pressure Threshold Measurements

U trap = Upper trapezius

M trap = Middle trapezius

L trap = Lower trapezius

A deltoid = Anterior deltoid

M deltoid = Middle deltoid

P deltoid = Posterior deltoid

# **Chapter I**

## **Introduction & Background**

## **Introduction**

Delayed onset muscle soreness (DOMS), is an unpleasant reality of exercising among bodybuilders. DOMS is a well-known and oftentimes mysterious condition felt 24 to 48 hours after strenuous physical activity, causing discomfort and pain.(Owens et al., 2018)This phenomenon has greatly affected athletes, making it difficult for them to train or compete at a high level of intense physical activity that causes fatigue and muscle pain the day after exercise.(Works, 2013) Sore muscles following a workout are a familiar feeling to many athletes.(Fletcher et al., 2016) Delayed onset muscle soreness (DOMS) is an even more extreme version of normal post-exercise soreness and it can drift in up to 48 hours after the physical activity that caused it.(Best et al., 2008)

Delayed onset muscle soreness (DOMS) is the muscle pain that usually sets in 1-2 days after the exercise, and can last for several days or up to a week. DOMS is a normal reaction to exercise and can take different amounts of time and intensity depending on the person and the environment. After exercise, athletes frequently experience DOMS, which is characterized by muscle soreness, stiffness, and pain. (Vaile et al., 2008)(Cheung et al., 2003a)

Delayed onset muscle soreness is one of the most important problems facing bodybuilders, due to exposure to muscle tension after exercising with high weights, which leads to ruptures in the muscle fibers, which in turn helps to inflate the muscles, this causes post-exercise soreness and thus affects the player's performance in the session coming and delays recovery, and reduces the player's chance of obtaining a perfect body

to participate in competitions for a bodybuilding show.(Barlow, Benjamin, Birt, Hughes, et al., 2002)

DOMS is caused by an eccentric type of muscle contraction in which the muscle contracts while lengthening. Additionally, muscle damage and DOMS are both more likely to occur when unaccustomed exercise is performed because fewer motor units in the muscle are activated than when the motor pattern is learned. The pathophysiology of DOMS lies behind that the sarcomere contractile units in the muscle are disrupted as a result of injury to the muscle cell membrane following unaccustomed exercise, according to research. Additionally, there is damage to the sarcoplasmic reticulum, which results in the leakage of calcium ions and accumulation of ions in the mitochondria, impairing the aerobic ATP production capacity. Furthermore, the calcium ions cause contractile protein corruption, which combined with disturbance to the sarcomere membrane, leads to the inflammatory response. At the point when injury to the sarcomere happens and calcium levels elevate, phospholipase A2 initiation is set off as well as arachidonic acid metabolism. Prostaglandins and leukotrienes are then synthesized. While leukotrienes increase vascular permeability, PGE2 directly contributes to the pain felt in response to DOMS. The recruitment of neutrophils to the injury is activated by this increase.(Works, 2013)

The duration and intensity of the exercise are significant components of the DOMS. Muscle spasms, connective tissue damage, lactic acid, and other potential causes of delayed onset muscle soreness are among the hypothesized explanations for the phenomenon. A muscle ache, on the other hand, is used to explain the existence of two or more theories. By reducing the joint's range of motion and dampening shock and torque,

delayed onset muscle soreness affects an athlete's performance. After a long break, returning to training often causes DOMS (Cheung et al., 2003b).

Athletes who return to training after a period of inactivity are more likely to experience delayed muscle soreness. It can influence athletic execution by causing a decreased joint ROM, greatest force loading and shock attenuation, putting unusual weight on muscle tendons and ligaments, and expanding the gamble of injury. (*View of The Incidence of Shoulder Injury among Collegiate Overhead Athletes*, 2009) Delayed onset muscle soreness is normal in bodybuilders, because of the power of activity and high loads that make micro-injuries to the muscle fibers. Overtraining is the unevenness between training and recovery. Athletes have been experiencing the symptoms of prolonged fatigue, loss of motivation, rigidity, and maladaptive responses to prolonged periods of overload and training stimulus for many decades. Flexibility to maladaptation as a result of repeated and prolonged injuries has also been recognized for some time (Cheung et al., 2003b).

The shoulder joint is one of the complex joints in the body, and it is frequently injured by athletes, and it is responsible for 30% of all injuries, injuries increase among bodybuilders participating in tournaments, they put high weights on their shoulders, and rest periods before the tournament decrease. Recently, shoulder pain has spread among greater part of everybody and they will suffer from it at some time in their lives. (*View of The Incidence of Shoulder Injury among Collegiate Overhead Athletes*, 2009)

Also, musculoskeletal abnormalities associated with shoulder problems accounted for about 20% of all disability costs caused by them (*Neck-and-Shoulder Pain, an Increasing Problem. Strategies for Using Insurance Material to Follow Trends - PubMed*, 1995).

Maintaining shoulder joint flexibility is an important aspect of health and fitness, especially for bodybuilders. Shoulder joint flexibility is essential for ensuring proper muscle development and optimizing performance, which is necessary for bodybuilders to progress in their goals. In healthy bodybuilders, shoulder joint flexibility can be maintained through proper exercises, conditioning, and knowledge about how to use the shoulder correctly. This essay will explore the importance of shoulder joint flexibility, how to increase it, and how to properly use the shoulder joint for bodybuilders. (*The New Encyclopedia of Modern Bodybuilding* - Arnold Schwarzenegger, Bill Dobbins - کتب Google, 1998)

Overall, shoulder joint flexibility among healthy bodybuilders is an essential component of any workout routine. It is especially important for bodybuilders to prioritize flexibility of the shoulder joint to prevent potential injury and optimize their routine. Maintaining shoulder joint flexibility and preventing muscle and joint issues that could result in serious injuries can all be prevented by stretching before and after a workout, exercising with proper form, and performing warm-up and cool-down exercises (Barlow, Benjamin, Birt, & Hughes, 2002).

Since the condition of the surrounding soft tissues determines range of motion, delayed onset muscle soreness can directly affect joint flexibility. If the patient has poor flexibility, ROM will be limited by injury to the delicate skeletal muscle, which is followed by an inflammatory process and subsequent fluid and electrolyte shifts. The ROM will be affected by the movement of the soft tissues that surround the joint because the muscles stop producing the force of their contraction and stop maintaining activity.

There are a variety of interventions for DOMS-related pain, additionally there was bad quality proof recommending that ultrasound, phototherapy, vibration, cryotherapy, massage, and active exercise have advantageous impacts in the management of pain connected with DOMS. The current evidence showed that the application of cold and heat therapy inside 1h water drenching and hot pack therapy, which made all that difference, could advance the recuperation of DOMS patients. According to the current evidence, DOMS patients' levels of pain could be effectively reduced by applying cold and heat therapy within one hour of exercise. DOMS patients' recovery could be accelerated for up to 24 hours with the most effective cold water immersion and hot pack therapy. (Nahon et al., 2021).

Dry cupping has been used as a treatment for DOMS instead of cold and heat due to its greater effectiveness in stimulating blood circulation and healing torn muscle fibers, and its results in treatment are faster than cold or heat. Dry cupping is readily available and can be used by the injured person, but the use of cold or heat requires special standards by the therapist, and its use on the athlete's body may be contraindicated for various reasons. It may be contraindication from use on the player's body for various reasons, and dry cupping treatment has been linked between DOMS and shoulder joint flexibility.

#### Research gap

- There are no studies targeting the shoulder joint.
- The measurements used in research are not accurate enough.
- The number of research participants is small.

For this gap, we will investigate it.

Dry cupping is a form of a noninvasive, conservative and safety management that has been used in Traditional Chinese Medicine to improve overall health and well-being for centuries. Recent studies have shown that this ancient practice has a variety of benefits that can be useful for bodybuilders, particularly in terms of increasing shoulder joint flexibility and reducing delayed muscle soreness. Dry cupping is a process wherein glass or plastic cups are put on the skin and pull is applied to make a vacuum, which can help to increase circulation, reduce inflammation, and release toxins from the body (Kang et al., 2021). Additionally, dry cupping is thought to stimulate the release of endorphins, which can reduce pain and improve relaxation.

According to research, dry cupping has been shown to improve shoulder function and reduce delayed onset muscle soreness in bodybuilders (Bridgett et al., 2018). The use of dry cupping therapy is important in sports medicine aimed at reducing musculoskeletal pain also improve digestive problems, mobility, and flexibility. About cosmetic purposes, cupping can also promote facial rejuvenation and body firming. it is known as myofascial decompression to increase the range of motion.(Schafer et al., 2020) Research indicates that there is an effect on joint flexibility and increased range of motion through muscle fiber liberation in the affected participants.(*Treatment Outcomes of Myofascial Decompression (Cupping Therapy) on Hamstring Pathology - ProQuest*, 2017)(Markowski et al., 2014a)

Fortunately, dry cupping is a natural management that may reduce these symptoms associated with DOMS. In this essay, this study will investigate the potential impacts of dry cupping on delayed onset muscle soreness (trapezius muscles (upper, middle, and

lower), and deltoid muscles (anterior, middle, and posterior)) and shoulder joint flexibility among healthy bodybuilders.

## **Scope**

### Aims:

This study aimed to investigate how dry cupping reduces delayed onset muscle soreness and improves shoulder joint flexibility to understand how they relate to creating and maintaining a healthy lifestyle and preventing injuries among bodybuilders. Reducing delayed onset muscle soreness and increasing shoulder joint flexibility can prove to be beneficial in a variety of situations when done with care, and this essay will explain how to effectively monitor them. Understanding the cause behind these symptoms and how to properly monitor the situation is crucial for maintaining physical well-being. shoulder joint flexibility is a prerequisite for movement to reach a full range of motion and is affected by several problems, including disease, muscle stiffness, incorrect posture during exercise, and others.

### **Problem Statement**

Delayed onset muscle soreness is a major and common problem facing bodybuilders, due to exposure to muscle tension and pain, which leads to poor joint flexibility and thus affects the player's performance in the next session and delays muscle recovery after exercise, and this may affect their ability to continue the exercise and delays them from participating in tournaments and reaching the goal they seek or they may lose the tournaments. The multiple ways in which dry cupping affects the body have been the subject of a lot of research. Up to the creator's information restricted examinations

explored the impact of dry cupping on delayed onset muscle soreness and joint flexibility of the upper body parts, especially among bodybuilders. Although these studies have not reached 40 baseball players, so that new methods of treatment could be adopted, especially since it's a safe, cheap, and fast way.

However, there was a need to conduct a study measuring the impact of dry cupping on delayed onset muscle soreness and shoulder joint flexibility.

## **Goals**

This paper will argue that understanding DOMS can lead to more effective treatment protocols in order to minimize its negative effects on athletic performance.

Therefore, the purpose of this essay is:

- To investigate how dry cupping affects bodybuilders' delayed onset muscle soreness.
- To investigate the effect of dry cupping on shoulder joint flexibility among bodybuilders.

## **Research Hypotheses**

- Dry cupping can decrease delayed onset muscle soreness among bodybuilders.
- Dry cupping can increase shoulder joint flexibility among bodybuilders.
- There were no statistically significant differences at the significance level ( $\alpha \leq 0.05$ ) in the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the age.

To answer the 3rd question, it was transformed into the following hypotheses:

- 1st hypothesis: There were no statistically significant differences at the significance level ( $\alpha \leq 0.05$ ) in the scores of the respondents before and after using dry cupping that decrease delayed muscle soreness and increase shoulder joint flexibility due to the age.
- 2nd hypothesis: There were no statistically significant differences at the significance level ( $\alpha \leq 0.05$ ) in the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the height.
- 3rd hypothesis: There were no statistically significant differences at the significance level ( $\alpha \leq 0.05$ ) in the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the weight.
- 4th hypothesis: There were no statistically significant differences at the significance level ( $\alpha \leq 0.05$ ) in the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the occupation.
- 5th hypothesis: There were no statistically significant differences at the significance level ( $\alpha \leq 0.05$ ) in the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the degree.
- 6th hypothesis: There were no statistically significant differences at the significance level ( $\alpha \leq 0.05$ ) in the scores of the respondents before and after using

dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the habits smoking.

- 7th hypothesis: There were no statistically significant differences at the significance level ( $\alpha \leq 0.05$ ) in the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the habits" alcohol.
- 8th hypothesis: There were no statistically significant differences at the significance level ( $\alpha \leq 0.05$ ) in the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the habits' hormone.
- 9th hypothesis: There were no statistically significant differences at the significance level ( $\alpha \leq 0.05$ ) in the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the habits' steroids.

# **Chapter II**

## **Literature review**

## **Literature Review:**

Several previous studies investigated the effect of dry cupping on various musculoskeletal conditions and the extent of its effect on delayed muscle soreness and shoulder joint flexibility. Some studies conduct that the DOMS has an immediate impact on shoulder joint flexibility, with the effects lasting up to three days or more.(Peters Jr., 2016) It is important to note that while DOMS can have an impact on shoulder joint flexibility, this effect can be minimized with proper rest and recovery techniques. (DOMS) is an important factor to consider when assessing the effects of physical activity on the flexibility of the shoulder joint. DOMS is an increasingly recognized phenomenon that can influence shoulder joint flexibility.(Peters Jr., 2016) A study by Ozmen et al. Aimed to identify the effect of DOMS on shoulder joint flexibility and was conducted on 40 healthy male individuals aged between 18 and 25. The results of the study showed that the range of motion (ROM) in the shoulder joint decreased significantly following the induction of DOMS. It was found that the anterior, posterior and external rotation of the shoulder joint were significantly less than the pre-DOMS measurements. The authors concluded that DOMS has a negative effect on shoulder joint flexibility and that individuals who experience DOMS should be cautious about performing activities that involve shoulder joint movement. This study provides further evidence that DOMS can have a negative effect on shoulder joint flexibility and that individuals should be aware of the potential consequences of DOMS on their shoulder joint mobility (Kirmizigil et al., 2020). According to a study conducted by Ozmen et al. (2016), DOMS has a significant negative impact on shoulder joint flexibility. The study involved a sample of 428 athletes,

with the data collected from self-reported shoulder joint flexibility tests and DOMS scales. The results showed that shoulder joint flexibility decreased significantly with increasing levels of DOMS. These findings supported the idea that DOMS has a direct effect on shoulder joint flexibility and that athletes should be aware of the potential for decreased flexibility with increased DOMS. In addition, the study suggested that further research is needed to determine the exact mechanisms by which DOMS affects shoulder joint flexibility and to identify effective strategies to reduce the negative impact of DOMS on flexibility. Overall, the findings of Ozmen et al. (2016) (Kirmizigil et al., 2020) suggested that DOMS should be taken into consideration when planning physical activity, as it can have a significant negative effect on shoulder joint flexibility. Another study conducted by S Imtiyaz et al, investigated that DOMS is a common phenomenon experienced by athletes and physical activity participants after strenuous exercise. DOMS is characterized by the onset of muscle pain and tenderness 24-72 hours after exercise and can last for three days or more. The effects of DOMS on shoulder joint flexibility are still under investigation, however, research suggests that DOMS may have an impact on shoulder joint flexibility. A study conducted by Imtiyaz et al. (2014)(Peters Jr., 2016) found that DOMS significantly reduces shoulder joint flexibility in athletes, with the greatest decrease in flexibility observed on the first day of DOMS. This suggests that DOMS has a significant and immediate impact on shoulder joint flexibility, with the effects lasting up to three days or more. It is important to note that while DOMS can have an impact on shoulder joint flexibility, this effect can be minimized with proper rest and recovery techniques.

Researchers conducted a lot of studies explaining the importance of maintaining flexibility for bodybuilders. According to a study by B. Beedle et al. found that shoulder joint flexibility is a key component in healthy bodybuilding performance. This study investigated the effects of shoulder joint flexibility on bodybuilding performance in a group of experienced male bodybuilders. The results indicated that those with greater shoulder joint flexibility had significantly better bodybuilding performance than those with lower shoulder joint flexibility. This suggests that shoulder joint flexibility is an important factor in achieving optimal bodybuilding performance. Additionally, the study also showed that shoulder joint flexibility was associated with increased muscle power and strength. This indicates that shoulder joint flexibility is an essential component of a successful bodybuilding program, as it can improve muscle power and strength, which are important elements of successful bodybuilding performance. Therefore, it is important for bodybuilders to maintain and optimize their performance. ((*L Kang et Al., 2021*)., 2021). According to A Schwarzenegger and B Dobbins (1998), shoulder joint flexibility can prevent injuries such as shoulder impingement and rotator cuff tears, as well as improve posture and shoulder strength. Furthermore, shoulder joint flexibility also helps bodybuilders increase the range of motion in their shoulder joints, allowing them to perform exercises more effectively and efficiently. This increase in efficiency can help bodybuilders reach their fitness goals more quickly, while reducing the risk of injury. Additionally, maintaining shoulder joint flexibility can help bodybuilders better recover from workouts, and reduce the soreness and stiffness that often accompany weightlifting. Thus, it is clear that maintaining shoulder joint flexibility is a key component of any bodybuilder's overall fitness regimen (Schwarzenegger, 1987).A study

conducted by Schwarzenegger and Dobbins (1998) sought to explore the benefits of improved shoulder joint flexibility in healthy bodybuilders. The study involved a sample of 41 bodybuilders who engaged in a standardized shoulder flexibility training regimen. The results of the study showed that those who participated in the training regimen were able to improve their shoulder joint mobility significantly. This was evidenced by a significant increase in shoulder joint range of motion and a decrease in shoulder joint pain. The findings of the study suggest that improved shoulder joint flexibility can have a positive impact on the health and performance of bodybuilders. Improved shoulder joint flexibility can reduce the risk of shoulder joint injuries and increase the range of motion of the shoulder joint. This increased range of motion can lead to increased strength and power in upper body exercises as well as improved posture and balance. Furthermore, improved shoulder joint flexibility can lead to improved overall physical health and wellbeing (Schwarzenegger, 1987). Several management methods have been investigated in previous studies to manage delayed onset muscle soreness and one of these studies conducted by Van Dam et al, showed that cold water immersion helps with delayed-onset muscle soreness after exercise. The effect of cooling tissues after exercise is similar to anti-inflammatory, thus reducing the risk of cardiovascular disease. Acute soft tissue injuries including sprains, strains, and muscle bruising have traditionally been treated with cryotherapy to reduce pain, edema, metabolism, and inflammation brought on by secondary damage (Van Dam et al., 2008). When the body is exposed to cold after exercise, it causes narrowing in the blood vessels, which increases blood flow and the transport of nutrients through the body. Also, a study conducted by K. L. Knight examined the impact of post-exercise stretching (i.e., cool down) on enhancing recovery

of strength and range of motion (ROM) and reducing DOMS after physical exertion. The research has a mixed and often contradictory set of findings, with several studies indicating that stretching after exercise is not effective in improving recovery. There was insufficient statistical evidence to reject the null hypothesis that stretching has an equivalent effect on recovery (Knight et al., 2000). Another study by N. AlKhadhrawi investigated that whole-body vibration reduces delayed onset muscle soreness after eccentric exercise in outstanding hockey players. One group underwent static stretching using WBV therapy, while the other group performed only stretching. Participants who received the WBV significantly reduced pain ( $P = 0.04$ ) and tightness of the quadriceps ( $P = 0.02$ ) compared to stretching only. (Akehurst et al., 2021) In 71 people with plantar heel pain, this study analyzed the impacts of myofascial trigger point dry cupping on pain and function. The two gatherings performed calf and plantar fascia stretching exercises and ankle dorsiflexion exercises. Dry cupping was also administered to the intervention group. The results were that dry cupping added MTrPs to self-extension exercises and ankle dorsiflexion exercises were only better to active self-extension ankle dorsiflexion activities in individuals with plantar heel pain, ankle dorsiflexion, and plantar flexion strength (AlKhadhrawi & Alshami, 2019).

Also a study by V. Vaidya investigated the differences between foam rolling and neurodynamic treatment during sedation sessions for healthy people who had delayed muscular soreness. In 60 healthy individuals, participants performed the two types of sedation separated by 4 weeks with random assignment. The results indicated that foam rolling is a better option than neurodynamic therapy for reducing the severity of delayed onset muscle soreness (Vaidya et al., 2021).

The impact of dry cupping on pain, soft tissue release, and musculoskeletal rehabilitation is the subject of in-depth research by other scientists. Salemi, M., et al. have recently studied dry cupping's benefits on chronic nonspecific low back pain and functional dysfunction. Members in the review were partitioned into two gatherings: those receiving sham treatment (n = 18) and cupping therapy (n = 19). Each gathering got five 10-minute measuring treatment meetings two times per week to animate the acupoints related with low back torment (GV4, BL23, BL24, BL25, BL30, BL40, and BL58) and profound viewpoints (HT3 and ST36). A visual simple scale (VAS) and the Oswestry Handicap File (ODI) were utilized to assess every member at three distinct places in the review: standard, post-treatment, and follow-up (a conclusion period of about a month). The results show that, both after treatment (mean difference), -2.36; standard deviation (SE): 0.58; p 0.001; " large size of the effect: -0.94) and follow-up (mean contrast: -1.71; SE: 0.81; p 0.042; " large size of the effect: -0.83) time focuses, the measuring treatment bunch had a lower mean VAS than the hoax bunch. The mean ODI of the cupping therapy group was lower than that of the sham group after treatment (mean difference: -4.68; SE: 1.85; p: 0.017; ' enormous' impact size: -0.87), despite the fact that the groups did not differ at the follow-up (mean difference: 4.16; SE: 2.97; p: 0.17; " medium" impact size: -0.70). The study found that dry cupping was better at reducing pain and functional disability in people with chronic nonspecific low back pain than sham cupping. 20 physically fit(Y.-C. Chiu et al., 2020).

A study conducted by R Bridgett et al. in 2018 aimed to evaluate the effects of dry cupping on musculoskeletal recovery and performance in bodybuilders. The study was conducted on 12 highly-trained bodybuilders, who underwent dry cupping for a period of

six weeks. The study found that dry cupping resulted in a significant improvement in the bodybuilders' musculoskeletal recovery, as measured by increased maximal isometric strength, improved muscle activation, and decreased muscle soreness. Moreover, the bodybuilders reported an improvement in their overall performance, as measured by an increase in the number of repetitions completed in their workouts and an increase in their training volume. The results of this study suggest that dry cupping may be an effective and safe method for improving musculoskeletal recovery and performance in bodybuilders. Moreover, these findings could be beneficial for athletes in other sports who may be searching for ways to improve their recovery and performance. Further studies should be conducted to further examine the effects of dry cupping on the musculoskeletal recovery and performance of athletes in various sports.(Bridgett et al., 2018)

Another management has been investigated to reduce muscle soreness by using dry cupping, in which a lot of scientific research has used dry cupping as an intervention to treat many pathological conditions, such as treating people who suffer from chronic nonspecific lower back pain(Silva et al., 2019), and athletes with myofascial pain syndrome (Y. C. Chiu et al., 2020), and for treating trigger points(Nasb et al., 2020), and on Gastrocnemius Muscle Stiffness, After Delayed Onset Muscle Soreness(*The Effect of Dry Cupping on Gastrocnemius Muscle Stiffness, Range of Motion and Pain Perception After Delayed Onset Muscle Soreness - PubMed*, Oct2022).

A study by Hammons, D et al, aims to investigate how therapy affects the medial gastrocnemius muscle's subjective pain, active dorsiflexion, and muscle stiffness after receiving cupping therapy. the study includes 20 physically fit, healthy volunteers from

10 women and 10 men, with an average age of 22.9 3.35 years performed an exercise routine to cause delayed onset muscle soreness in both lower legs. Intervention. The medial gastrocnemius of the dominant leg received a 5-minute dry cupping treatment, whereas the non-dominant control limb had a 5-minute rest. According to the study's findings, no discernible improvement in muscle soreness symptoms was seen after treatment. Key outcome indicators. A baseline, pre-treatment, post-treatment, and five minutes after the treatment was used to quantify muscle stiffness, active dorsiflexion, and subjective pain. (*The Effect of Dry Cupping on Gastrocnemius Muscle Stiffness, Range of Motion and Pain Perception After Delayed Onset Muscle Soreness - PubMed, Oct2022*).

However, dry cupping was not used on the upper part of the body (the shoulder joint), especially on bodybuilders, because they lift high weights that cause pressure on the muscle fibers and then tear them, which causes delayed muscle soreness after exercise. Dry cupping was not used on the shoulder joint directly to measure flexibility.

One of the limitations that I encountered during sample collection was that the participants did not adhere to the time specified for the examination.

The non-cooperation of some gyms with us to collect samples for the study, the difficulty in obtaining a device for measuring the pain threshold pressure, and the excessive use of steroid analgesics from the players that reduces the effect of the effectiveness of dry cupping, and some of the players have sensitive skin and refused to apply the intervention of dry cupping on their bodies.

Dry cupping is used through plastic cups that create negative pressure by suctioning them on the surface of the skin. Dry cupping was used all over the world and dates back to

ancient times in 400 BC. Dry and wet cupping was of great importance in treating many diseases, including headaches, indigestion, narcolepsy, and fainting, as listed by Herodotus (Mehta & Dhapte, 2015b). Cupping therapy is related to bone and muscle diseases in the back and extremities, lung diseases, and pharyngitis, as stated by Hippocrates (Greece) (Mehta & Dhapte, 2015b). Cupping therapy was used in many treatments in ancient Europe as well. And it was used as a means to extract toxins from the bites of snakes and wild animals, as brought by the scientist Celsus. And Galen described various cups of glass, horn, and copper.(Mehta & Dhapte, 2015b) Cupping consists of two types dry and wet. Wet cupping is surgical and involves bloodletting. Dry cupping does not involve any surgical intervention (non-invasive). However, the most common form of cupping therapy is dry cupping. (Aboushanab & AlSanad, 2018)

The origin of word “Hijama” comes from the Arabic language, in which “Hajj” means suction and expansion.(Ghods et al., 2016)

Dry cupping is used to treat musculoskeletal pain, and it is an old technique that has been newly developed over time.(Rozenfeld & Kalichman, 2016) It is a traditional treatment of Chinese medicine; it became famous after the 2016 Olympic Games around the world held in Brazil. Online searches of related databases were performed using (PubMed, Google Scholar, and OvidSP), and Google Trends detailed an ascent in looks for cupping therapy in 2016 and cupping therapy turned into a well-known point that year.(*Interest in Cupping Therapy Spikes after Michael Phelps Gold Win | Rio 2016 | The Guardian*, 2017)(Qureshi et al., 2017) Cupping therapy has become important and popular in the eyes of physiotherapists due to its ease of use, low cost, and no adverse effects.(Trofa et al., 2020)(Markowski et al., 2014a) Non-invasive dry cupping helps to stimulate blood

circulation and increase blood flow in the muscles in the area to be treated through the use of plastic cups, to create negative pressure on the areas of the body applied.(Trofa et al., 2020) Once the surface of the skin is stimulated, bodily signals are converted into biological signals, which produce a therapeutic effect by activating the -neuroendocrine immune system.(Guo et al., 2017) The time of application and the strength of the suction are not yet proven and were estimated to be between 5 and 10 minutes with a negative pressure of 300 millibars (two forces of pull in a manual suction pump). Applying cupping to the skin's surface generates bruising, which usually disappears within 10 days.(Markowski et al., 2014b)

Dry cupping has been used to improve delayed onset muscle soreness and joint flexibility, which helps reduce pain, release muscle fascia, enhance the healing process, improve functional impairment, and relieve adhesions and muscle trigger points.(Gozubuyuk et al., 2018)(Stephens et al., 2020)

Since delayed onset muscle soreness and Shoulder joint flexibility are among the major problems facing bodybuilders and affect their performance and participation in tournaments, and it is the main restriction for them, the dry cupping intervention is an easy-to-apply, cheap and available technique that has no side effects. Thus, if we conclude from this study found that dry cupping may help ease delayed onset muscle soreness and improve shoulder joint flexibility, this helps players to intensify their training and participate in tournaments.

Overall, dry cupping could have a beneficial effect on delayed onset muscle soreness and shoulder joint flexibility among healthy bodybuilders. Dry cupping could be used as an effective and low-risk modality for bodybuilders to gain relief from DOMS and improve

mobility. Further research should be conducted to determine the potential long terms benefits and explore the different types of dry cupping and their effect on athletes and bodybuilders.

Therefore, if our study had positive results from the use of dry cupping to reduce delayed onset muscle soreness and improve shoulder joint flexibility, then this will help the players to reduce their use of analgesics and steroidal drugs and thus add to physical therapists a new technique to reduce delayed onset muscle soreness and improve shoulder joint flexibility in a faster way.

# **Chapter III**

# **Methodology**

## **Methodology**

### Study design:

The research design is a quantitative/quasi-experimental study on bodybuilders, where one group has undergone a pre-test and post-test after 48-72 hours.

### Setting:

Local gyms in Jenin area were chosen to study this research on bodybuilders and will be organized in more than one gym.

### Procedures:

Initially, a request was submitted to obtain an IRB approval letter from the Scientific Research Ethics Committee at the Arab American University on 17/1/2023, and it was reviewed on 15/2/2023, and approval was obtained to start collecting samples on 4/3/2023.

Each participant underwent a pre-test in which we measured delayed onset muscle soreness with a pain pressure threshold device, and shoulder range of motion through shoulder flexibility test and we measured pain intensity through visual analog scale (VAS). A one-time session is scheduled to be performed at least two hours after the exercise. Once the player had rested for two hours, we started the intervention, which involved applying sterile cups (for single use) to the shoulder muscles, which included three trapezius muscles (upper, middle, and lower), as well as three Deltoids muscles (anterior, middle, and posterior). Typically, the cups are left in place for about 7 minutes,

perhaps longer (Mehta & Dhapte, 2015a). Histological alterations were seen in the skin without any cellular infiltration due to vasodilation and edema. Erythema, edema, and bruising in a distinctive circular pattern are common cupping side effects. Within a few weeks, most localized skin changes disappear (Mehta & Dhapte, 2015a). And the evaluation is post-test after 48 -72 hours.

#### Participants:

The research included 40 participants and Jenin area was chosen to study this research on bodybuilders and will be organized in more than one gym, and aged between 20-40, all male, complain of delayed muscle soreness, shoulder joint flexibility with a score of approximately 4-7 on the visual analog scale, and be able to give written informed consent and be available to attend physical therapy sessions. We clarify the research to them and explain how we will do it. If they agree, the consent form is signed and written consent is taken from the gym from which we will select the players. The next day, we begin to do an initial pre-test, and two hours after the exercise, the intervention with dry cupping begins and after 48 hours the measurement is carried out post-test.

Mild pain was excluded, so that it would not cause delayed muscle pain, and severe pain was excluded because it is expected to cause an injury and require medical intervention. Therefore, the average pain ratio was chosen from 4-7.(D'emeh et al., 2016)

Inclusion criteria and exclusion criteria:

Inclusion criteria:

- All participants have a strong physique and participated in international and local tournaments.

- Ages between 20-40 years.
- They were all male.
- They complied of delayed onset muscle soreness and flexibility of the shoulder joint with a score of approximately 4-7 according to the visual analog scale.
- Able to give written informed consent.
- Available to attend physical therapy sessions.

#### Exclusion criteria

- Take pain relievers for the last 8 weeks
- People infected with the Coronavirus during the period specified for the study.
- Fractures, serious injury, or shoulder surgery in his medical history
- Shoulder joint injection within the last month.
- Sports injury during follow-up.
- Sensitive skin.
- Vascular disease.

#### Sampling methods:

The researcher contacted the licensed local gyms.

The local sports clubs were contacted by the researcher, and permission was obtained to collect samples. Every participant received a clear explanation of the study and its goals. If they were in agreement, the consent form was signed and formal permission was obtained from the gym where the players will be chosen. The appointments were set up so that we would begin by collecting an initial assessment from the participants, contact them two hours after the exercise to organize a visit, then provide the intervention dry cupping for seven minutes and collect another initial evaluation after 48 hours.

So that the participant is informed from the start about how the research will be conducted and given the option to accept or reject it.

### **Research Sample:**

The study sample consisted of (40) participants of bodybuilder, who were randomly selected, and Table 1 shows the sample's demographic characteristics:

**Table 1: The sample's demographic characteristics**

<b>Variable</b>	<b>Variable level</b>	<b>Frequency</b>	<b>Percentage%</b>
<b>Age</b>	less than 25	12	30.0
	25-35	22	55.0
	greater than 35	6	15.0
	<b>Total</b>	<b>40</b>	<b>100.0</b>
<b>Hight</b>	less than 170	10	25.0
	170-180	19	47.5
	greater than 180	11	27.5
	<b>Total</b>	<b>40</b>	<b>100.0</b>
<b>Weight</b>	less than 75	10	25.0
	75-90	18	45.0
	greater than 90	12	30.0
	<b>Total</b>	<b>40</b>	<b>100.0</b>
<b>Occupation</b>	student	1	2.5
	trainer	5	12.5
	worker	23	57.5
	employee	11	27.5
	<b>Total</b>	<b>40</b>	<b>100.0</b>
<b>Degree</b>	Tawjihi	17	42.5

Variable	Variable level	Frequency	Percentage%
	BA	21	52.5
	MA	2	5.0
	<b>Total</b>	<b>40</b>	<b>100.0</b>
<b>Smoking Habit</b>	No	14	35.0
	Yes	26	65.0
	<b>Total</b>	<b>40</b>	<b>100.0</b>
<b>Alcohol Habit</b>	No	38	95.0
	Yes	2	5.0
	<b>Total</b>	<b>40</b>	<b>100.0</b>
<b>Hormone Habit</b>	No	36	90.0
	Yes	4	10.0
	<b>Total</b>	<b>40</b>	<b>100.0</b>
<b>Steroid Habit</b>	No	38	95.0
	Yes	2	5.0
	<b>Total</b>	<b>40</b>	<b>100.0</b>
<b>Medicine used</b>	<b>No</b>	<b>40</b>	<b>100.0</b>
<b>Family history</b>	<b>No</b>	<b>40</b>	<b>100.0</b>

Outcome measures:

- The visual analog scale (VAS) to quantify the severity of shoulder pain will be the primary outcome measure.
- The pain pressure threshold device (Algometer) measures and evaluates the pain threshold.
- Shoulder joint flexibility.

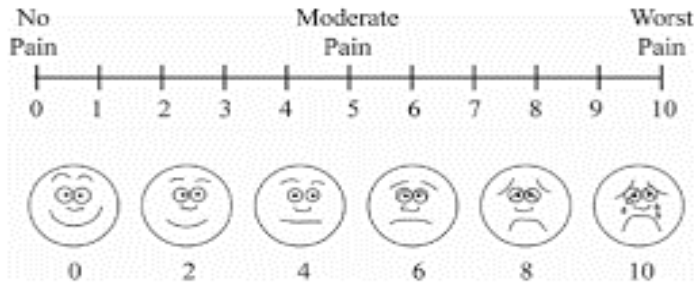
Visual Analogue Scale (VAS):

The Visual Analogue Scale (VAS) is a widely used instrument for pain measurement. The VAS has been validated and shown to be sensitive to changes in a patient's perception of pain level. For the majority of patients, it is easy to use and understand. In addition to allowing meaningful comparison of measurements over time (Chiarotto et al., 2019), VAS is preferable for general clinical use because it appears to be less biased than the comparative one. Additionally, it appears that the patients' capacity to consistently utilize the VAS varies widely among them. Therefore, it is important to consider a variety

of complementary pain relief indicators when evaluating the effectiveness of treatment, as well as the individual's tendency to bias his estimates (Carlsson, 1983). For VAS, high reliability and concurrent validity were discovered (Phan et al., 2012). Using the VAS (100-mm line), NRS (0-10), and VRS (four-point) scales, 471 randomly selected individuals with persistent itch (200 men, 271 women, mean age 58.44 years) documented the intensity of their pruritus. Following 60 minutes, re-test reliability in a subgroup of 250 patients was examined. Measurable analysis revealed good legitimacy and dependability at the same time ( $r > 0.8$ ;  $p < 0.01$ ) for all apparatuses. All scales' average upsides had a strong correlation. Overall, it was determined that VAS, NRS, and VRS are of the highest unshakable quality and simultaneous legitimacy. On the second test, there was a greater connection and fewer missing traits. Before starting a clinical preliminary, a training session is advised. (Phan et al., 2012)

The scale VAS is used to assess a patient's level of pain, track its evolution, or compare the severity of pain in patients with comparable diseases. A VAS scale is a line with verbal anchors at either end that is typically 10 cm long. The point on the line that corresponds to the patient's assessment of pain intensity receives a mark from the patient. The pain scale ranges from 0 (no pain) to 10 (severe pain).

To indicate the severity of the participant's shoulder pain during the past week, the researcher asks the participant to select the VAS scale on the form shown in the data collection sheet, and based on that, the patient marks the symbol corresponding to his pain intensity, greater pain intensity is indicated by a higher score. So that zero (0) means no pain, and ten (10) means severe pain.



### Pain Pressure Threshold:

In many clinical settings, pain assessment is an important parameter. An inexpensive, valid, and dependable pressure algometer would make it possible for a wide range of healthcare professionals to perform an objective assessment of pressure pain. but, the algometer is frequently costly, restricting its everyday use in clinical and research settings. The findings show that clinicians use the pressure pain threshold method more frequently because it provides valid and reliable measurements of the pressure pain threshold (Fischer, 1986).

The use of the pressure threshold device is for determining tender spots and trigger points. The minimum pressure that causes pain or discomfort is known as the pressure threshold. The device consists of a force gauge with a range of 11 kg and a 1 cm<sup>2</sup> rubber disc attached to it. This surface has been demonstrated sufficient for the evaluation of deep tenderness in soft tissues. For medicolegal purposes, the device is used clinically to quantify tenderness, but primarily to demonstrate the presence of trigger points to patients and healthcare professionals (Jerez-Mayorga et al., 2020).

On a force platform, a single rater randomly compressed 60 times. Twenty volunteers had their pressure pain thresholds measured twice, three days apart, by two raters. The key

outcome measures were the maximum peak force (in kPa) and the pressure pain threshold (adapted pressure algometer vs. force platform). The Cronbach's alpha test was employed to assess internal consistency. With lower and higher bounds of agreement, the measurement bias was estimated using the Bland-Altman method, and estimates of the measurement error were derived using the standard error of measurement.

No differences were found when comparing the compression outcomes ( $P = 0.51$ ). The validity and internal intra-rater consistencies ranged from 0.84 to 0.99, whereas the standard error of measurement ranged from 0.005 to 0.04 kPa. There was low likelihood of measurement bias and extremely strong correlations ( $r = 0.73-0.74$ ) to very perfect correlations ( $r = 0.99$ ). The outcomes showed that the digitally modified pressure algometer was valid and inter-rater reliable. Results for inter-rater reliability ( $r = 0.55-0.60$ ; Cronbach's alpha = 0.71-0.75) were moderate.

Pain pressure algometry showed high reliability for PPT measurements. The proposed method of Fischer's diagnosis of myofascial pain syndrome had a low sensitivity and relatively high specificity. Because of comparing various research results, pressure pain threshold might be helpful in assessing the impact of treatment for musculoskeletal and myofascial pain syndrome (*Pressure Pain Threshold Measurement*, Epub 2022 Jul 5).

Device information:

Dolorimeter (2 pound sensitivity) with circular probe.

This device is used to evaluate pain threshold.

Product Dimensions 4 x 6 x 10 inches; 7.2 Ounces

Item Weight 7.2 ounces

Department Supply

Manufacturer Baseline

ASIN B00381Z31O

Item model number 12-1440

### Shoulder joint flexibility

Shoulder range of motion (ROM) is measured using a shoulder flexibility test (*Flexibility Test: How To Assess Full-Body Flexibility At Home? - Physiociti, 2011*) Procedure for shoulder flexibility test, the researcher ask the participant to:

1. Reach the back of the neck with the right hand.
2. Turn with the left hand until reaching the back area.
3. Make an effort to touch the tips of both of your hands behind your back.
4. Have someone measure how far apart the fingertips are.
5. Switch sides and perform the test with your left hand on the back of your neck and your right hand on your back.

The distance between both middle fingertips is measured, and the extent of flexibility is measured by means of score in which it's **very good flexibility** when the participant can clasp hands together, and it's **good but need work** when fingertips almost touch, and the score is **poor, needs a lot of work** when the fingertips are not within an inch of touching.

A study that used a digital inclinometer and goniometer to quantify active shoulder mobility, and it looked at the intrarater reliability and concurrent validity of those results.

In a blinded repeated measures approach, two researchers measured shoulder flexion, abduction, internal rotation, and external rotation in 30 asymptomatic adults using a goniometer and a digital inclinometer.

Digital inclinometry and goniometry intraclass correlation coefficients showed strong intrarater reliability. (ICC- 3,k) of 0.94 and 0.95, respectively. With ICC (3,k) values of less than 0.85, digital inclinometry and goniometry had acceptable concurrent validity. The discrepancy between these two measuring tools may be anticipated to vary from 2° to 20°, according to the 95% limits of agreement.

The findings suggest that goniometry and digital inclinometers can be used interchangeably to quantify shoulder mobility. Clinically significant variations are likely to exist when using these measures interchangeably, thus clinicians should take the 95% limits of agreement into account.(Kolber & Hanney, 2012)

### **Interventions:**

The researcher ask the patient to expose the shoulder and back area, then we sterilized the area. After determining the trigger points at which to apply the cups and suctioning them twice for seven minutes, we informed the patient that the cups would leave marks there.

The researcher finds trigger points by palpating the muscle deeply, trapezius muscles by palpating the muscle superficially, and all three portions of the muscle can be felt directly because they originate in the spinous processes of C7-T12 vertebrae. The massive shallow back muscle known as the trapezius has a trapezoid-like shape. It stretches out

horizontally to the spine of the scapula and downwards from the occipital bone's external lump to the lower thoracic vertebrae. The trapezius is made up of three fibers: upper, middle, and lower. (Ourieff et al., 2023)

Insertion on the scapula's spine, acromion, and lateral third of the clavicle. When the patient experiences severe pain, we instruct him to abduct his shoulders to a 90-degree angle and then retract them by applying thumb pressure to a variety of muscle areas.

Origin of the deltoid muscle: anterior fibers: Clavicle's anterior surface, which is close to the pectoralis major's lateral fibers.

-The Lower/Mid Head: Superior surface of the scapula from the Acromion Process

- Posterior head: Spine of the Scapula, Back Line (Rispoli et al., 2009).

Insertion

-Deltoid tuberosity on the humerus is the insertion.

By bending the elbow to 90 degrees and having the patient abduct the shoulder against resistance, the deltoids can be felt.

With the elbow extended, the shoulder abducted to 90 degrees, and resisting horizontal adduction, the anterior fibers are palpated. Posterior Fibers palpated by positioning the patient the same as above and then resist horizontal abduction (Chaurasia, 2007).

The pain pressure threshold device (Algometer) measures and evaluates the pain threshold, and points on the muscles are determined by palpating the trigger points, and these are determined by knowing the muscle anatomy. The researcher asks the participant to sit on a chair and expose the upper part of the body, after sterilizing the area, the

participant should be calm and relax, then the researcher begins to identify the trigger points in the following muscles (trapezius muscles (upper, middle, and lower), as well as three Deltoids muscles (anterior, middle, and posterior). After determining the trigger points, the device is placed on it and pressed for a long time until the patient gives a verbal cue that indicated the presence of pain in the specified area.

The measurement is taken on the first day, two hours after exercise, and then 48 hours later, the second measurement is taken two hours after exercise, and the measurements are recorded on the data collection sheet, and thus the difference between the two measurements becomes clear to us.

**The Materials used in the intervention was:**

1. cupping cups
2. suction device
3. cotton
4. sterilizers
5. Pain Threshold Meter
6. Meters measure

**Check the normal distribution of the data:**

To determine whether the data were distributed regularly or not, the researcher employed the Kolmogorov-Smirnov test, as shown in table. (2).

**Table (2): Kolmogorov-Smirnov**

Variable	Test	Kolmogorov-Smirnov		
		Statistic	df	Sig.
VAS	Pretest	0.072	40	.200*
	Posttest	0.132	40	.078
U trapezius	Pretest	0.089	40	.200*

Variable	Test	Kolmogorov-Smirnov		
		Statistic	df	Sig.
M trap	Posttest	0.103	40	.200*
	Pretest	0.094	40	.200*
	Posttest	0.117	40	.185
L trap	Pretest	0.122	40	.137
	Posttest	0.127	40	.100
M deltoid	Pretest	0.094	40	.200*
	Posttest	0.112	40	.200*
P deltoid	Pretest	0.097	40	.200*
	Posttest	0.078	40	.200*
A deltoid	Pretest	0.059	40	.200*
	Posttest	0.111	40	.200*
Sholder joint flexibility-Distance	Pretest	0.109	40	.200*
	Posttest	0.112	40	.200*
Dominant part-C7	Pretest	0.093	40	.200*
	Posttest	0.109	40	.200*
Dominant part-PSIS	Pretest	0.099	40	.200*
	Posttest	0.088	40	.200*

It is clear from the data in Table (2) that the statistical significance of all variables was greater than (0.05) on the pre and post measurements, and this indicates that the data is distributed normally, and this allows the researcher to use parametric tests to answer the study's questions and examine its hypotheses.

## Statistical treatment:

The Statistical Package for the Social Sciences (SPSS) was utilized for data collection and result calculation. The following measurable methods were used:

1. Descriptive statistics, which are used to categorize the frequency of variables in accordance with the researcher's perspective as stated in the description of the study variables, include percentages, arithmetic averages, and standard deviation.
2. The Paired Sample T-test was used to determine the statistical significance of the differences between the pre- and post-tests of the study's dimensions.

3. Independent Samples T. Test: to measure the statistical differences in means between the two categories (yes, no) of (habits smoking, habits" alcohol, and habits' hormone).
4. To determine whether there is a statistically significant difference between several means among the respondents, the One-Way Analysis of Variance (ANOVA) is used.
5. Scheffe test for two-dimensional comparisons to determine the source of the differences.
6. Cohen's d is a measure of effect size commonly used in statistics to quantify the difference between two means. It indicates the standardized difference between two groups' means in terms of standard deviations. Cohen's d is particularly useful when comparing the means of two independent groups in experimental or observational studies.

$d = \frac{\bar{X}_1 - \bar{X}_2}{s}$  The formula to calculate Cohen's d is as follows:

Where:

$\bar{X}_1$  is the mean of the first group.

$\bar{X}_2$  is the mean of the second group.

(s) is the pooled standard deviation.

Cohen's d can take positive or negative values. A positive value indicates that the first group's mean is larger than the second group's mean, while a negative value indicates the opposite. The magnitude of Cohen's d represents the effect size. In general, larger values of Cohen's d indicate a larger effect size.

Interpretation of Cohen's d values can vary, but a common guideline is as follows:

- Small effect size: around 0.2

- Medium effect size: around 0.5

# **Chapter IV**

## **Analyzing the results of the study**

To address their questions and test hypotheses, a statistical analysis of the study's data is presented in this chapter.

### **Q1: What is the effect of dry cupping on Delayed onset muscle soreness among bodybuilders?**

From the first question, the following hypothesis emerged:

#### **H1: Dry cupping can decrease Delayed onset muscle soreness among bodybuilders.**

To investigate the hypothesis, the means, and standard deviations of the experimenter's pre- and post-test results regarding the effect of dry cupping on bodybuilders' muscle soreness. The significance of the differences was determined through the use of the paired samples t-test. Table (3) describes those outcomes.

**Table (3): paired samples t-test results of the differences between the pre- and post-test of the experimental of the effect of dry cupping on muscle soreness among bodybuilders.**

	Variable	Application	N	Mean	Standard Deviation	t value	Sig.	Cohen's <i>d</i>
Pain pressure threshold measurement	VAS	Pre-test	40	5.30	1.69	6.49	0.001	1.44
		Post-test	40	3.83	1.61			
	U trapezius	Pre-test	40	2.70	0.70	-4.80	0.001	0.43
		Post-test	40	3.03	0.68			
	M trap	Pre-test	40	3.03	1.22	-2.54	0.015	0.97
		Post-test	40	3.42	0.73			
	L trap	Pre-test	40	3.21	0.86	-7.78	0.001	0.33
		Post-test	40	3.62	0.76			
	M deltoid	Pre-test	40	3.10	0.87	-8.66	0.001	0.31
		Post-test	40	3.52	0.73			
	P deltoid	Pre-test	40	3.15	0.87	-8.17	0.001	0.31
		Post-test	40	3.55	0.82			
	A deltoid	Pre-test	40	2.37	1.23	-2.72	0.004	1.56
		Post-test	40	2.79	1.27			

't' table value at (39) df. at (0.05) sig. level equal (2.05)

't' table value at (39) df. at (0.01) sig. level equal (2.76)

The data in table (3) showed the following results:

- 1- It was found through the use of a (VAS) that there are statistically significant differences between the pre and posttests of the effect of dry cupping on muscle soreness among bodybuilders. The differences were in favor of the post-test with an

arithmetic mean of (3.83) versus (5.30) for the pre-test, and this means that dry cupping reduced delayed muscle pain among bodybuilders ( $P < 0.5$ ). Cohen's d value was (1.44), which means that dry cupping has a significant effect in reducing delayed muscle pain among bodybuilders.

- 2- The following was found by measuring the pain pressure threshold before and after using dry cupping:
  - A- There are statistically significant differences between the pre and posttests of the effect of dry cupping on U trapezius among bodybuilders. The differences were in favor of the post-test with an arithmetic mean of (3.03) versus (2.70) for the pre-test, and this means that dry cupping increasing the U trapezius among bodybuilders. Cohen's d value was (0.43), which means that dry cupping has a medium effect in increasing U trapezius among bodybuilders.
  - B- There are statistically significant differences between the pre and posttests of the effect of dry cupping on M trap among bodybuilders. The differences were in favor of the post-test with an arithmetic mean of (3.42) versus (3.03) for the pre-test, and this means that dry cupping increasing the M trap among bodybuilders. Cohen's d value was (0.97), which means that dry cupping has a significant effect in increasing M trap among bodybuilders.
  - C- There are statistically significant differences between the pre and posttests of the effect of dry cupping on L trap among bodybuilders. The differences were in favor of the post-test with an arithmetic mean of (3.62) versus (3.21) for the pre-test, and this means that dry cupping increasing the L trap among bodybuilders. Cohen's d value was (0.33), which means that dry cupping has a medium effect in increasing L trap among bodybuilders.
  - D- There are statistically significant differences between the pre and posttests of the effect of dry cupping on M deltoid among bodybuilders. The differences were in favor of the post-test with an arithmetic mean of (3.52) versus (3.10) for the pre-test, and this means that dry cupping increasing the M deltoid among bodybuilders. Cohen's d value was (0.31), which means that dry cupping has a medium effect in increasing M deltoid among bodybuilders.

- E- There are statistically significant differences between the pre and posttests of the effect of dry cupping on P deltoid among bodybuilders. The differences were in favor of the post-test with an arithmetic mean of (3.55) versus (3.15) for the pre-test, and this means that dry cupping increasing the P deltoid among bodybuilders. Cohen's d value was (0.31), which means that dry cupping has a medium effect in increasing P deltoid among bodybuilders.
- F- There are statistically significant differences between the pre and posttests of the effect of dry cupping on A-deltoid among bodybuilders. The differences were in favor of the post-test with an arithmetic mean of (2.79) versus (2.37) for the pre-test, and this means that dry cupping increasing the A-deltoid among bodybuilders. Cohen's d value was (1.56), which means that dry cupping has a significant effect in increasing A-deltoid among bodybuilders.

In general, it is clear that dry cupping reduced delayed muscle pain among bodybuilders, So the first hypothesis was accepted.

**Q2: What is the effect of dry cupping on shoulder joint flexibility among bodybuilders?**

From the 2<sup>nd</sup> question, the following hypothesis emerged:

**H2: Dry cupping can increase shoulder joint flexibility among bodybuilders.**

To examine the 2<sup>nd</sup> hypothesis, the means and standard deviations of the pre- and the post-test results of the experimental of the effect of dry cupping on shoulder joint flexibility among bodybuilders. Paired samples t-test was used to measure the significance of the differences. Table (4) describes those results.

**Table (4): paired samples t-test results of the differences between the pre- and post-test of the experimental of the effect of dry cupping on shoulder joint flexibility among bodybuilders.**

Variables	Application	N	Mean	Standard Deviation	t value	Sig.	Cohen's <i>d</i>
Sholder joint flexibility	distance/Pre	40	22.98	8.76	11.54	0.001	2.48
	distance/post	40	18.45	8.73			
Dominant part	C7/pre	40	7.43	2.95	-7.53	0.001	1.91
	C7/post	40	9.70	3.26			
Dominant part	PSIS/pre	40	25.05	6.16	-10.86	0.001	2.31
	PSIS/post	40	29.03	6.57			

't' table value at (39) df. at (0.05) sig. level equal (2.05)

't' table value at (39) df. at (0.01) sig. level equal (2.76)

The data in table (4) showed the following results:

- 1- It is clear that dry cupping increases the flexibility of the shoulder joint by reducing the distance in the shoulder joint, as the pre-distance was (22.98) versus (18.45) for the post-distance, meaning that using dry cupping reducing the distance in the shoulder joint, which leads to an increase in its flexibility. Cohen's *d* value was (2.48), which means that dry cupping has a significant effect in increasing the flexibility of the shoulder joint.
- 2- It is clear that the use of dry cupping increases the flexibility of the shoulder joint by increasing (C7) in the dominant part, as it reached (C7) in the pre-test (7.43) versus (9.70) in the post-test, and the difference was in favor of the post-test, this means that an increase in (C7) of the dominant part leads to increased flexibility of the shoulder joint. Cohen's *d* value was (1.91), which means that dry cupping has a significant effect in increasing the flexibility of the shoulder joint.

Also, it is clear that the use of dry cupping increases the flexibility of the shoulder joint by increasing (PSIS) in the dominant part, as it reached (PSIS) in the pre-test (25.05) versus (29.03) in the post-test, and the difference was in favor of the post-test, this means that an increase in (PSIS) of the dominant part leads to increased

flexibility of the shoulder joint. Cohen's d value was (2.31), which means that dry cupping has a significant effect in increasing the flexibility of the shoulder joint. So, we conclude that dry cupping was increasing shoulder joint flexibility among bodybuilders. Accept second hypothesis.

**Q3: Are there any differences in the scores of the respondents on the pre and post measurements of dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the demographic variables (Age, Hight, Wight, Occupation, Degree, Habits smoking, Habits alcohol, Habits hormone, Habits steroids)?**

To answer the 3<sup>rd</sup> question, it was transformed into the following hypotheses:

**1<sup>st</sup> hypothesis: There were no statistically significant differences at the significance level ( $\alpha \leq 0.05$ ) in the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the age.**

One-Way ANOVA test was conducted to compare the averages of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the age.

**Table (5): Means, Standard Deviation, conducted to compare the averages of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the age.**

Variable		Age	N	Pre		Post	
				mean	Std.	mean	Std.
VAS		less than 25	12	5.63	1.37	3.33	1.60
		25-35	22	5.45	1.37	4.18	1.49
		greater than 35	6	5.33	1.51	3.50	1.97
		Total	40	5.49	1.36	3.83	1.61
Pain Pressure Threshold Measurement	U trapezius	less than 25	12	2.52	0.69	2.72	0.61
		25-35	22	2.60	0.61	3.01	0.62
		greater than 35	6	3.43	0.67	3.73	0.56
		Total	40	2.70	0.70	3.03	0.68
	M trap	less than 25	12	2.90	0.64	3.28	0.72

Variable	Age	N	Pre		Post		
			mean	Std.	mean	Std.	
	25-35	22	2.89	0.78	3.34	0.73	
	greater than 35	6	3.58	0.87	4.00	0.61	
	Total	40	3.00	0.77	3.42	0.73	
	L trap	less than 25	12	3.10	0.88	3.64	0.75
		25-35	22	3.10	0.85	3.49	0.78
		greater than 35	6	3.82	0.72	4.05	0.67
		Total	40	3.21	0.86	3.62	0.76
	M deltoid	less than 25	12	2.79	0.47	3.27	0.47
		25-35	22	3.08	1.02	3.52	0.83
		greater than 35	6	3.75	0.54	4.05	0.49
		Total	40	3.10	0.87	3.52	0.73
	P deltoid	less than 25	12	2.94	0.70	3.42	0.63
		25-35	22	3.11	0.99	3.47	0.92
		greater than 35	6	3.72	0.50	4.10	0.57
		Total	40	3.15	0.87	3.55	0.82
	A deltoid	less than 25	12	2.50	0.61	2.91	0.53
25-35		22	2.51	0.78	3.00	0.91	
greater than 35		6	3.05	0.65	3.48	0.65	
Total		40	2.59	0.72	3.04	0.78	
Sholder Joint Flexibility	less than 25	12	24.25	9.05	19.67	7.74	
	25-35	22	21.95	9.10	17.68	9.70	
	greater than 35	6	24.17	7.78	18.83	7.78	
	Total	40	22.98	8.76	18.45	8.73	
Dominant part (C7)	less than 25	12	7.25	2.56	9.46	2.86	
	25-35	22	7.77	3.07	9.50	3.45	
	greater than 35	6	5.50	2.07	8.33	2.94	
	Total	40	7.28	2.85	9.31	3.16	
Dominant part (PSIS)	less than 25	12	25.75	5.01	30.25	5.24	
	25-35	22	25.18	7.19	28.64	7.77	
	greater than 35	6	23.17	4.26	28.00	4.15	
	Total	40	25.05	6.16	29.03	6.57	

Through the data presented in table (5), it is clear that there are apparent differences between the mean scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the age. To check the significance of the differences, the researcher use One-Way Anova test as shows in table (6).

**Table (6): One-Way ANOVA to check the differences in the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the age.**

Variable	Source of Variance	Sum of Squares	df	Mean Square	F	Sig.	
VAS	Pre	Between Groups	0.39	2	0.197	0.102	0.903
		Within Groups	71.35	37	1.928		
		Total	71.74	39			
	Post	Between Groups	6.34	2	3.168	1.241	0.301
		Within Groups	94.44	37	2.552		
		Total	100.78	39			
U trapezius	Pre	Between Groups	3.83	2	1.915	4.619	0.016
		Within Groups	15.34	37	0.415		
		Total	19.17	39			
	Post	Between Groups	4.15	2	2.076	5.551	0.008
		Within Groups	13.84	37	0.374		
		Total	17.99	39			
M trap	Pre	Between Groups	2.44	2	1.222	2.158	0.130
		Within Groups	20.95	37	0.566		
		Total	23.40	39			
	Post	Between Groups	2.42	2	1.212	2.415	0.103
		Within Groups	18.57	37	0.502		
		Total	21.00	39			
L trap	Pre	Between Groups	2.62	2	1.310	1.853	0.171
		Within Groups	26.15	37	0.707		
		Total	28.77	39			
	Post	Between Groups	1.51	2	0.754	1.316	0.280
		Within Groups	21.19	37	0.573		
		Total	22.70	39			
M deltoid	Pre	Between Groups	3.68	2	1.841	2.645	0.084
		Within Groups	25.76	37	0.696		
		Total	29.44	39			
	Post	Between Groups	2.46	2	1.228	2.516	0.095
		Within Groups	18.05	37	0.488		
		Total	20.51	39			
P deltoid	Pre	Between Groups	2.48	2	1.242	1.691	0.198

Variable	Source of Variance		Sum of Squares	df	Mean Square	F	Sig.
		Within Groups	27.18	37	0.734		
		Total	29.66	39			
	Post	Between Groups	2.16	2	1.080	1.677	0.201
		Within Groups	23.82	37	0.644		
		Total	25.98	39			
A deltoid	Pre	Between Groups	1.50	2	0.748	1.460	0.245
		Within Groups	18.94	37	0.512		
		Total	20.44	39			
	Post	Between Groups	1.43	2	0.715	1.175	0.320
		Within Groups	22.53	37	0.609		
		Total	23.96	39			
Sholder Joint Flexibility	Pre	Between Groups	50.94	2	25.469	0.320	0.728
		Within Groups	2942.04	37	79.515		
		Total	2992.98	39			
	Post	Between Groups	31.63	2	15.814	0.199	0.820
		Within Groups	2938.27	37	79.413		
		Total	2969.90	39			
Dominant part (C7)	Pre	Between Groups	24.36	2	12.181	1.545	0.227
		Within Groups	291.61	37	7.881		
		Total	315.98	39			
	Post	Between Groups	6.78	2	3.391	0.328	0.722
		Within Groups	382.56	37	10.340		
		Total	389.34	39			
Dominant part (PSIS)	Pre	Between Groups	27.54	2	13.772	0.351	0.706
		Within Groups	1452.36	37	39.253		
		Total	1479.90	39			
	Post	Between Groups	27.63	2	13.817	0.309	0.736
		Within Groups	1655.34	37	44.739		
		Total	1682.98	39			

Table (6) shows the following results:

- 1- There are no differences that are statistically significant on level (0.05) in the averages of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the age. The significance level for statistical significance for VAS before using dry cupping was (0.903), which is greater than (0.05) and not statistically significant, and the value of statistical significance for VAS after using dry cupping was (0.301), which is greater than (0.05) and not statistically

significant. This indicates that the change in VAS does not differ with different age levels.

- 2- There are differences that are statistically significant on level (0.05) in the averages of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the age. The significance level for statistical significance for (U trapezius) before using dry cupping was (0.016), which is less than (0.05) and statistically significant, and the value of statistical significance for (U trapezius) after using dry cupping was (0.008), which is less than (0.05) and statistically significant. This indicates that the change in (U trapezius) was differ with different age levels.

To find the source of the differences the researcher used Scheffe Test as shown in table (7):

**Table (7): Scheffe test results for binary comparisons of the differences in the mean scores of the study sample on the pre and posttests with respect to (U trapezius) due to the age.**

Variable	Comparisons	means	25-35	greater than 35
<b>U trapezius (Pretest)</b>	less than 25	2.52	-0.08	-0.91*
	25-35	2.60	-----	-0.83*
	greater than 35	3.43	-----	-----
<b>U trapezius (Posttest)</b>	less than 25	2.72	-0.29	-1.01*
	25-35	3.01	-----	-0.72*
	greater than 35	3.73	-----	-----

\* The mean difference is significant at the 0.05 level.

From Table (7), the binary comparisons indicate that the differences in the averages of the study sample before using dry cupping to decrease delayed onset muscle soreness with the treatment of (U trapezius) due to age were among those aged (35) years and less and those aged (more than 35) years, For the benefit of those over (35) years old.

The binary comparisons also indicated that the differences in the averages of the study sample after the use of dry cupping to reduce delayed muscle pain with the treatment of (U trapezius) due to age were between those at the age of (35) years and less and those who were older (more). From 35 years old and for the benefit of those over 35 years old.

- 3- There are no statistically significant differences on level (0.05) in the averages of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the age. The significance level for statistical significance for M trap before using dry cupping was (0.130), which is greater than (0.05) and not statistically significant, and the value of statistical significance for M trap after using dry cupping was (0.103), which is greater than (0.05) and not statistically significant. This indicates that the change in M trap does not differ with different age levels.
- 4- There are no statistically significant differences on level (0.05) in the averages of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the age. The significance level for statistical significance L trap before using dry cupping was (0.171), which is greater than (0.05) and not statistically significant, and the value of statistical significance for L trap after using dry cupping was (0.280), which is greater than (0.05) and not statistically significant. This indicates that the change in L trap does not differ with different age levels.
- 5- There are no statistically significant differences on level (0.05) in the averages of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the age. The significance level for statistical significance for M deltoid before using dry cupping was (0.084), which is greater than (0.05) and not statistically significant, and the value of statistical significance for M deltoid after using dry cupping was (0.095), which is greater than (0.05) and not statistically significant. This indicates that the change in M deltoid does not differ with different age levels.
- 6- There are no statistically significant differences on level (0.05) in the averages of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the age. The significance level for statistical significance for P deltoid before using dry cupping was (0.198), which is greater than (0.05) and not statistically significant, and the value of statistical significance for P deltoid after using dry cupping was (0.201), which is greater than (0.05) and not statistically significant. This indicates that the change in P deltoid does not differ with different age levels.

- 7- There are no statistically significant differences on level (0.05) in the averages of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the age. Where the value of statistical significance for A deltoid before using dry cupping was (0.245), which is greater than (0.05) and not statistically significant, and the value of statistical significance for A deltoid after using dry cupping was (0.320), which is greater than (0.05) and not statistically significant. This indicates that the change in A deltoid does not differ with different age levels.
- 8- There are no statistically significant differences on level (0.05) in the averages of the scores of the respondents before and after using dry cupping that increase shoulder joint flexibility among bodybuilders due to the age. The significance level for statistical significance for sholder joint flexibility (distance) before using dry cupping was (0.728), which is greater than (0.05) and not statistically significant, and the value of statistical significance for sholder joint flexibility (distance) after using dry cupping was (0.820), which is greater than (0.05) and not statistically significant. This indicates that the change in sholder joint flexibility (distance) does not differ with different age levels.
- 9- There are no statistically significant differences on level (0.05) in the averages of the scores of the respondents before and after using dry cupping that shoulder joint flexibility among bodybuilders due to the age. The significance level for statistical significance for dominant part (C7) before using dry cupping was (0.227), which is greater than (0.05) and not statistically significant, and the value of statistical significance for dominant part (C7) after using dry cupping was (0.722), which is greater than (0.05) and not statistically significant. This indicates that the change in dominant part (C7) does not differ with different age levels.

There are no statistically significant differences on level (0.05) in the averages of the scores of the respondents before and after using dry cupping that shoulder joint flexibility among bodybuilders due to the age. Where the value of statistical significance for dominant part (PSIS) before using dry cupping was (0.706), which is greater than (0.05) and not statistically significant, and the value of statistical significance for dominant part (PSIS) after using dry cupping was (0.736), which is

greater than (0.05) and not statistically significant. This indicates that the change in dominant part (PSIS) does not differ with different age levels.

**2<sup>nd</sup> hypothesis: There were no statistically significant differences at the significance level ( $\alpha \leq 0.05$ ) in the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the height.**

One-Way ANOVA test was conducted to compare the average of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the height.

**Table (8): Means, Standard Deviation, conducted to compare the average of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the height.**

Variable		Height	N	Pre		Post	
				mean	Std.	mean	Std.
VAS		less than 170	10	6.30	1.16	4.45	1.44
		170-180	19	5.39	1.30	3.58	1.77
		greater than 180	11	4.91	1.38	3.68	1.42
		Total	40	5.49	1.36	3.83	1.61
Pain Pressure Threshold Measurement	U trapezius	less than 170	10	2.89	0.96	3.21	0.97
		170-180	19	2.48	0.61	2.85	0.57
		greater than 180	11	2.91	0.49	3.19	0.49
		Total	40	2.70	0.70	3.03	0.68
	M trap	less than 170	10	3.26	0.79	3.71	0.81
		170-180	19	2.73	0.71	3.18	0.68
		greater than 180	11	3.22	0.78	3.56	0.67
		Total	40	3.00	0.77	3.42	0.73
	L trap	less than 170	10	3.40	0.84	3.80	0.86
		170-180	19	3.07	0.89	3.54	0.75
		greater than 180	11	3.26	0.86	3.59	0.74
		Total	40	3.21	0.86	3.62	0.76
	M deltoid	less than 170	10	3.41	0.95	3.87	0.80
		170-180	19	2.79	0.83	3.26	0.66
		greater than 180	11	3.34	0.75	3.66	0.66

Variable	Height	N	Pre		Post		
			mean	Std.	mean	Std.	
Variable	Total	40	3.10	0.87	3.52	0.73	
	P deltoid	less than 170	10	3.17	1.07	3.59	1.06
		170-180	19	2.92	0.75	3.39	0.70
		greater than 180	11	3.53	0.82	3.79	0.77
		Total	40	3.15	0.87	3.55	0.82
	A deltoid	less than 170	10	2.84	0.94	3.26	0.95
		170-180	19	2.35	0.51	2.84	0.50
		greater than 180	11	2.77	0.76	3.20	1.00
		Total	40	2.59	0.72	3.04	0.78
	Sholder Joint Flexibility	less than 170	10	21.40	11.02	16.00	11.25
170-180		19	22.68	7.92	18.68	8.28	
greater than 180		11	24.91	8.40	20.27	7.06	
Total		40	22.98	8.76	18.45	8.73	
Dominant part (C7)	less than 170	10	8.00	3.30	10.05	3.83	
	170-180	19	6.74	2.51	8.95	3.08	
	greater than 180	11	7.55	3.05	9.27	2.80	
	Total	40	7.28	2.85	9.31	3.16	
Dominant part (PSIS)	less than 170	10	24.40	7.23	28.70	7.69	
	170-180	19	25.32	5.91	29.05	6.78	
	greater than 180	11	25.18	6.13	29.27	5.68	
	Total	40	25.05	6.16	29.03	6.57	

Through the data presented in table (8), it is clear that there are apparent differences between the mean scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the height. To check the significance of the differences, the researcher use One-Way Anova test as shows in table (9).

**Table (9): One-Way ANOVA to check the differences in the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the height.**

Variable	Source of Variance		Sum of Squares	df	Mean Square	F	Sig.
VAS	Pre	Between Groups	10.45	2	5.223	3.152	0.060
		Within Groups	61.30	37	1.657		
		Total	71.74	39			
	Post	Between Groups	5.28	2	2.641	1.023	0.369
		Within Groups	95.49	37	2.581		
		Total	100.78	39			
U trapezius	Pre	Between Groups	1.73	2	0.863	1.831	0.174
		Within Groups	17.44	37	0.471		
		Total	19.17	39			
	Post	Between Groups	1.24	2	0.621	1.372	0.266
		Within Groups	16.75	37	0.453		
		Total	17.99	39			
M trap	Pre	Between Groups	2.62	2	1.311	2.334	0.111
		Within Groups	20.78	37	0.562		
		Total	23.40	39			
	Post	Between Groups	2.17	2	1.086	2.134	0.133
		Within Groups	18.83	37	0.509		
		Total	21.00	39			
L trap	Pre	Between Groups	0.75	2	0.373	0.492	0.615
		Within Groups	28.02	37	0.757		
		Total	28.77	39			
	Post	Between Groups	0.46	2	0.232	0.386	0.682
		Within Groups	22.23	37	0.601		
		Total	22.70	39			
M deltoid	Pre	Between Groups	3.41	2	1.703	2.421	0.103
		Within Groups	26.03	37	0.704		
		Total	29.44	39			
	Post	Between Groups	2.76	2	1.378	2.873	0.069
		Within Groups	17.75	37	0.480		
		Total	20.51	39			
P deltoid	Pre	Between Groups	2.57	2	1.283	1.752	0.188
		Within Groups	27.09	37	0.732		
		Total	29.66	39			
	Post	Between Groups	1.14	2	0.572	0.852	0.435
		Within Groups	24.84	37	0.671		
		Total	25.98	39			
A deltoid	Pre	Between Groups	2.06	2	1.031	2.077	0.140
		Within Groups	18.37	37	0.497		
		Total	20.44	39			
	Post	Between Groups	1.55	2	0.775	1.279	0.290

Variable	Source of Variance		Sum of Squares	df	Mean Square	F	Sig.
		Within Groups	22.41	37	0.606		
		Total	23.96	39			
Sholder Joint Flexibility	Pre	Between Groups	67.56	2	33.780	0.427	0.655
		Within Groups	2925.41	37	79.065		
		Total	2992.98	39			
	Post	Between Groups	97.61	2	48.806	0.629	0.539
		Within Groups	2872.29	37	77.629		
		Total	2969.90	39			
Dominant part (C7)	Pre	Between Groups	11.56	2	5.782	0.703	0.502
		Within Groups	304.41	37	8.227		
		Total	315.98	39			
	Post	Between Groups	7.99	2	3.995	0.388	0.681
		Within Groups	381.35	37	10.307		
		Total	389.34	39			
Dominant part (PSIS)	Pre	Between Groups	5.76	2	2.879	0.072	0.930
		Within Groups	1474.14	37	39.842		
		Total	1479.90	39			
	Post	Between Groups	1.75	2	0.873	0.019	0.981
		Within Groups	1681.23	37	45.439		
		Total	1682.975	39			

Table (9) shows the following results:

- 1- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the height. The significance level for statistical significance for VAS before using dry cupping was (0.060), which is greater than (0.05) and not statistically significant, and the value of statistical significance for VAS after using dry cupping was (0.369), which is greater than (0.05) and not statistically significant. This indicates that the change in VAS does not differ with different height levels.
- 2- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the height. The significance level for statistical significance for (U trapezius) before using dry cupping was (0.174), which is greater than (0.05) and not statistically significant, and the value of statistical significance for (U trapezius) after using dry cupping was (0.266), which is greater than (0.05) and not

statistically significant. This indicates that the change in (U trapezius) does not differ with different height levels.

- 3- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the height. Where the value of statistical significance for M trap before using dry cupping was (0.111), which is greater than (0.05) and not statistically significant, and the value of statistical significance for M trap after using dry cupping was (0.133), which is greater than (0.05) and not statistically significant. This indicates that the change in M trap does not differ with different height levels.
- 4- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the height. Where the value of statistical significance for L trap before using dry cupping was (0.615), which is greater than (0.05) and not statistically significant, and the value of statistical significance for L trap after using dry cupping was (0.682), which is greater than (0.05) and not statistically significant. This indicates that the change in L trap does not differ with different height levels.
- 5- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the height. Where the value of statistical significance for M deltoid before using dry cupping was (0.103), which is greater than (0.05) and not statistically significant, and the value of statistical significance for M deltoid after using dry cupping was (0.069), which is greater than (0.05) and not statistically significant. This indicates that the change in M deltoid does not differ with different height levels.
- 6- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the height. The significance level for statistical significance for P deltoid before using dry cupping was (0.188), which is greater than (0.05) and not statistically significant, and the value of statistical significance for P deltoid after using dry cupping was (0.435), which is greater than (0.05) and not statistically significant. This indicates that the change in P deltoid does not differ with different height levels.

- 7- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the height. Where the value of statistical significance for A deltoid before using dry cupping was (0.140), which is greater than (0.05) and not statistically significant, and the value of statistical significance for A deltoid after using dry cupping was (0.290), which is greater than (0.05) and not statistically significant. This indicates that the change in A deltoid does not differ with different height levels.
- 8- There are no statistically significant differences on level (0.05) in the averages of the scores of the respondents before and after using dry cupping that increase shoulder joint flexibility among bodybuilders due to the height. The significance level for statistical significance for shoulder joint flexibility (distance) before using dry cupping was (0.655), which is greater than (0.05) and not statistically significant, and the value of statistical significance for sholder joint flexibility (distance) after using dry cupping was (0.539), which is greater than (0.05) and not statistically significant. This indicates that the change in sholder joint flexibility (distance) does not differ with different height levels.
- 9- There are no statistically significant differences on level (0.05) in the averages of the scores of the respondents before and after using dry cupping that shoulder joint flexibility among bodybuilders due to the height. The significance level for statistical significance for dominant part (C7) before using dry cupping was (0.502), which is greater than (0.05) and not statistically significant, and the value of statistical significance for dominant part (C7) after using dry cupping was (0.681), which is greater than (0.05) and not statistically significant. This indicates that the change in dominant part (C7) does not differ with different height levels.
- 10- There are no statistically significant differences on level (0.05) in the averages of the scores of the respondents before and after using dry cupping that shoulder joint flexibility among bodybuilders due to the height. Where the value of statistical significance for dominant part (PSIS) before using dry cupping was (0.930), which is greater than (0.05) and not statistically significant, and the value of statistical significance for dominant part (PSIS) after using dry cupping was (0.981), which is

greater than (0.05) and not statistically significant. This indicates that the change in dominant part (PSIS) does not differ with different height levels.

**3<sup>rd</sup> hypothesis: There were no statistically significant differences at the significance level ( $\alpha \leq 0.05$ ) in the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the weight.**

One-Way ANOVA test was conducted to compare the average of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the weight.

**Table (10): Means, Standard Deviation, conducted to compare the average of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the weight.**

Variable		Weight	N	Pre		Post	
				Mean	Std.	mean	Std.
VAS		less than 75	10	5.60	1.51	3.50	2.05
		75-90	18	5.61	1.38	4.36	1.43
		greater than 90	12	5.21	1.27	3.29	1.29
		Total	40	5.49	1.36	3.83	1.61
Pain Pressure Threshold Measurement	U trapezius	less than 75	10	2.54	0.85	3.02	0.86
		75-90	18	2.71	0.68	3.04	0.58
		greater than 90	12	2.83	0.63	3.03	0.71
		Total	40	2.70	0.70	3.03	0.68
	M trap	less than 75	10	2.97	0.56	3.41	0.69
		75-90	18	3.01	0.89	3.41	0.72
		greater than 90	12	2.99	0.81	3.43	0.85
		Total	40	3.00	0.77	3.42	0.73
	L trap	less than 75	10	2.94	0.97	3.52	0.85
		75-90	18	3.49	0.71	3.79	0.71
		greater than 90	12	3.01	0.90	3.44	0.78
		Total	40	3.21	0.86	3.62	0.76
	M deltoid	less than 75	10	2.88	0.92	3.42	0.79
		75-90	18	3.15	0.95	3.54	0.77
		greater than 90	12	3.19	0.73	3.58	0.66

Variable	Weight	N	Pre		Post		
			Mean	Std.	mean	Std.	
P deltoid	Total	40	3.10	0.87	3.52	0.73	
	less than 75	10	3.03	0.92	3.37	0.84	
	75-90	18	3.27	0.87	3.66	0.82	
	greater than 90	12	3.08	0.90	3.53	0.84	
	Total	40	3.15	0.87	3.55	0.82	
	A deltoid	less than 75	10	2.66	0.82	3.12	0.84
		75-90	18	2.56	0.67	3.01	0.81
		greater than 90	12	2.58	0.78	3.03	0.77
		Total	40	2.59	0.72	3.04	0.78
	Sholder Joint Flexibility	less than 75	10	19.30	7.83	15.40	8.38
75-90		18	20.61	7.46	16.33	8.28	
greater than 90		12	29.58	8.17	24.17	7.42	
Total		40	22.98	8.76	18.45	8.73	
Dominant part (C7)	less than 75	10	8.60	3.31	10.70	3.56	
	75-90	18	7.22	2.46	9.17	3.11	
	greater than 90	12	6.25	2.77	8.38	2.71	
	Total	40	7.28	2.85	9.31	3.16	
Dominant part (PSIS)	less than 75	10	26.70	5.40	31.20	5.85	
	75-90	18	25.33	7.28	29.33	7.53	
	greater than 90	12	23.25	4.75	26.75	5.22	
	Total	40	25.05	6.16	29.03	6.57	

Through the data presented in table (10), it is clear that there are apparent differences between the mean scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the weight. To check the significance of the differences, the researcher use One-Way Anova test as shows in table (11).

**Table (11): One-Way ANOVA to check the differences in the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the weight.**

Variable	Source of Variance		Sum of Squares	df	Mean Square	F	Sig.
VAS	Pre	Between Groups	1.34	2	0.668	0.351	0.706
		Within Groups	70.41	37	1.903		
		Total	71.74	39			
	Post	Between Groups	9.64	2	4.822	1.958	0.156
		Within Groups	91.13	37	2.463		
		Total	100.78	39			
U trapezius	Pre	Between Groups	0.47	2	0.235	0.465	0.632
		Within Groups	18.70	37	0.505		
		Total	19.17	39			
	Post	Between Groups	0.00	2	0.002	0.005	0.995
		Within Groups	17.98	37	0.486		
		Total	17.99	39			
M trap	Pre	Between Groups	0.01	2	0.006	0.009	0.991
		Within Groups	23.39	37	0.632		
		Total	23.40	39			
	Post	Between Groups	0.00	2	0.002	0.004	0.996
		Within Groups	20.99	37	0.567		
		Total	21.00	39			
L trap	Pre	Between Groups	2.62	2	1.308	1.851	0.171
		Within Groups	26.15	37	0.707		
		Total	28.77	39			
	Post	Between Groups	0.99	2	0.497	0.848	0.436
		Within Groups	21.70	37	0.587		
		Total	22.70	39			
M deltoid	Pre	Between Groups	0.63	2	0.314	0.404	0.671
		Within Groups	28.81	37	0.779		
		Total	29.44	39			
	Post	Between Groups	0.15	2	0.077	0.140	0.870
		Within Groups	20.36	37	0.550		
		Total	20.51	39			
P deltoid	Pre	Between Groups	0.46	2	0.228	0.289	0.751
		Within Groups	29.20	37	0.789		
		Total	29.66	39			
	Post	Between Groups	0.55	2	0.275	0.400	0.673
		Within Groups	25.43	37	0.687		
		Total	25.98	39			
A deltoid	Pre	Between Groups	0.07	2	0.033	0.061	0.941
		Within Groups	20.37	37	0.551		
		Total	20.44	39			
	Post	Between Groups	0.09	2	0.043	0.066	0.936

Variable	Source of Variance		Sum of Squares	df	Mean Square	F	Sig.
		Within Groups	23.87	37	0.645		
		Total	23.96	39			
Sholder Joint Flexibility	Pre	Between Groups	759.68	2	379.840	6.293	0.004
		Within Groups	2233.29	37	60.359		
		Total	2992.98	39			
	Post	Between Groups	565.83	2	282.917	4.354	0.020
		Within Groups	2404.07	37	64.975		
		Total	2969.90	39			
Dominant part (C7)	Pre	Between Groups	30.21	2	15.107	1.956	0.156
		Within Groups	285.76	37	7.723		
		Total	315.98	39			
	Post	Between Groups	30.18	2	15.091	1.555	0.225
		Within Groups	359.16	37	9.707		
		Total	389.34	39			
Dominant part (PSIS)	Pre	Between Groups	67.55	2	33.775	0.885	0.421
		Within Groups	1412.35	37	38.172		
		Total	1479.90	39			
	Post	Between Groups	111.13	2	55.563	1.308	0.283
		Within Groups	1571.85	37	42.482		
		Total	1682.98	39			

Table (11) shows the following results:

- 1- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the weight. The significance level for statistical significance for VAS before using dry cupping was (0.706), which is greater than (0.05) and not statistically significant, and the value of statistical significance for VAS after using dry cupping was (0.156), which is greater than (0.05) and not statistically significant. This indicates that the change in VAS does not differ with different weight levels.
- 2- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the weight. The significance level for statistical significance for (U trapezius) before using dry cupping was (0.632), which is greater than (0.05) and not statistically significant, and the value of statistical significance for (U trapezius) after using dry cupping was (0.995), which is greater than (0.05) and not

statistically significant. This indicates that the change in (U trapezius) does not differ with different weight levels.

- 3- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the weight. The significance level for statistical significance for M trap before using dry cupping was (0.991), which is greater than (0.05) and not statistically significant, and the value of statistical significance for M trap after using dry cupping was (0.996), which is greater than (0.05) and not statistically significant. This indicates that the change in M trap does not differ with different weight levels.
- 4- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the weight. The significance level for statistical significance for L trap before using dry cupping was (0.171), which is greater than (0.05) and not statistically significant, and the value of statistical significance for L trap after using dry cupping was (0.436), which is greater than (0.05) and not statistically significant. This indicates that the change in L trap does not differ with different weight levels.
- 5- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the weight. The significance level for statistical significance for M deltoid before using dry cupping was (0.671), which is greater than (0.05) and not statistically significant, and the value of statistical significance for M deltoid after using dry cupping was (0.870), which is greater than (0.05) and not statistically significant. This indicates that the change in M deltoid does not differ with different weight levels.
- 6- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the weight. The significance level for statistical significance for P deltoid before using dry cupping was (0.751), which is greater than (0.05) and not statistically significant, and the value of statistical significance for P

deltoid after using dry cupping was (0.673), which is greater than (0.05) and not statistically significant. This indicates that the change in P deltoid does not differ with different weight levels.

- 7- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the weight. The significance level for statistical significance for A deltoid before using dry cupping was (0.941), which is greater than (0.05) and not statistically significant, and the value of statistical significance for A deltoid after using dry cupping was (0.936), which is greater than (0.05) and not statistically significant. This indicates that the change in A deltoid does not differ with different weight levels.
- 8- There are no statistically significant differences on level (0.05) in the averages of the scores of the respondents before and after using dry cupping that increase shoulder joint flexibility among bodybuilders due to the weight. The significance level for statistical significance for sholder joint flexibility (distance) before using dry cupping was (0.004), which is less than (0.05) and statistically significant, and the value of statistical significance for sholder joint flexibility (distance) after using dry cupping was (0.020), which is less than (0.05) and not statistically significant. This indicates that the change in sholder joint flexibility (distance) was differ with different weight levels.

To find the source of the differences the researcher used Scheffe Test as shown in table (12):

**Table (12): Scheffe test results for binary comparisons of the differences in the mean scores of the study sample on the pre and posttests with respect to (sholder joint flexibility (distance)) due to the weight.**

Variable	Comparisons	means	75-90	greater than 90
<b>Sholder joint flexibility Pre(distance)</b>	less than 75	19.30	-1.31	-10.28*
	75-90	20.61	-----	-8.97*
	greater than 90	29.58	-----	-----
<b>Sholder joint flexibility Post(distance)</b>	less than 75	15.40	-0.93	-8.77*
	75-90	16.33	-----	-7.84*
	greater than 90	24.17	-----	-----

\* The mean difference is significant at the 0.05 level.

From Table (12), the binary comparisons indicate that the differences in the averages of the study sample before using dry cupping to decrease delayed onset muscle soreness with the treatment of (sholder joint flexibility (distance)) due to the weight were among those weight (90)kg and less and those weight (more than 90)kg, For the benefit of those over (90) kg.

The binary comparisons indicate that the differences in the averages of the study sample after using dry cupping to decrease delayed onset muscle soreness with the treatment of (sholder joint flexibility (distance)) due to the weight were among those weight (90)kg and less and those weight (more than 90)kg, For the benefit of those over (90) kg.

9- There are no differences that are statistically significant on level (0.05) in the averages of the scores of the respondents before and after using dry cupping that shoulder joint flexibility among bodybuilders due to the weight. Where the value of statistical significance for dominant part (C7) before using dry cupping was (0.156), which is greater than (0.05) and not statistically significant, and the value of statistical significance for dominant part (C7) after using dry cupping was (0.225), which is greater than (0.05) and not statistically significant. This indicates that the change in dominant part (C7) does not differ with different weight levels.

10- There are no differences that are statistically significant on level (0.05) in the averages of the scores of the respondents before and after using dry cupping that shoulder joint flexibility among bodybuilders due to the weight. Where the value of statistical

significance for dominant part (PSIS) before using dry cupping was (0.421), which is greater than (0.05) and not statistically significant, and the value of statistical significance for dominant part (PSIS) after using dry cupping was (0.283), which is greater than (0.05) and not statistically significant. This indicates that the change in dominant part (PSIS) does not differ with different weight levels.

**4<sup>th</sup> hypothesis: There were no statistically significant differences at the significance level ( $\alpha \leq 0.05$ ) in the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the occupation.**

One-Way ANOVA test was conducted to compare the average of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the occupation.

**Table (13): Means, Standard Deviation, conducted to compare the average of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the occupation.**

Variable		Occupation	N	Pre		Post	
				mean	Std.	mean	Std.
VAS		trainer	5	5.60	1.52	2.80	2.17
		worker	23	5.20	1.23	3.80	1.36
		employee	11	5.91	1.51	4.18	1.78
		Total	39	5.49	1.36	3.83	1.61
Pain Pressure Threshold Measurement	U trapezius	trainer	5	3.16	0.55	3.08	0.86
		worker	23	2.66	0.69	2.95	0.66
		employee	11	2.45	0.59	3.06	0.60
		Total	39	2.70	0.70	3.03	0.68
	M trap	trainer	5	3.44	0.70	3.88	0.88
		worker	23	2.88	0.76	3.29	0.68
		employee	11	2.94	0.80	3.41	0.75
		Total	39	3.00	0.77	3.42	0.73
	L trap	trainer	5	3.74	0.75	4.12	0.64
		worker	23	3.11	0.93	3.52	0.83
		employee	11	3.08	0.71	3.55	0.64
		Total	39	3.21	0.86	3.62	0.76

Variable	Occupation	N	Pre		Post		
			mean	Std.	mean	Std.	
	M deltoid	trainer	5	3.50	0.57	3.88	0.53
		worker	23	2.98	0.91	3.46	0.76
		employee	11	3.18	0.93	3.54	0.75
		Total	39	3.10	0.87	3.52	0.73
	P deltoid	trainer	5	3.28	0.72	3.90	0.70
		worker	23	3.09	0.97	3.49	0.89
		employee	11	3.29	0.77	3.61	0.68
		Total	39	3.15	0.87	3.55	0.82
	A deltoid	trainer	5	2.38	0.67	2.80	0.64
		worker	23	2.53	0.73	2.93	0.74
		employee	11	2.67	0.67	3.27	0.88
		Total	39	2.59	0.72	3.04	0.78
Sholder Joint Flexibility	trainer	5	27.60	11.41	24.00	10.46	
	worker	23	24.26	8.50	19.52	8.75	
	employee	11	17.73	6.39	13.18	5.74	
	Total	39	22.98	8.76	18.45	8.73	
Dominant part (C7)	Trainer.	5	6.00	2.35	7.90	1.82	
	worker	23	7.13	2.88	9.04	3.40	
	employee	11	7.55	2.38	9.91	2.47	
	Total	39	7.28	2.85	9.31	3.16	
Dominant part (PSIS)	trainer	5	24.60	7.20	27.20	6.98	
	worker	23	24.74	7.04	28.43	7.44	
	employee	11	26.18	3.95	31.36	4.20	
	Total	39	25.05	6.16	29.03	6.57	

\* There is only one student, so he was excluded from this hypothesis.

Through the data presented in table (13), it is clear that there are apparent differences between the mean scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the occupation. To check the significance of the differences, the researcher use One-Way Anova test as shows in table (14).

**Table (14): One-Way ANOVA to check the differences in the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the occupation.**

Variable	Source of Variance		Sum of Squares	Df	Mean Square	F	Sig.
VAS	Pre	Between Groups	6.27	3	2.088	1.148	0.343
		Within Groups	65.48	36	1.819		
		Total	71.74	39			
	Post	Between Groups	9.47	3	3.156	1.244	0.308
		Within Groups	91.31	36	2.536		
		Total	100.78	39			
U trapezius	Pre	Between Groups	4.06	3	1.352	3.220	0.034
		Within Groups	15.11	36	0.420		
		Total	19.17	39			
	Post	Between Groups	1.78	3	0.592	1.315	0.284
		Within Groups	16.21	36	0.450		
		Total	17.99	39			
M trap	Pre	Between Groups	2.33	3	0.776	1.326	0.281
		Within Groups	21.07	36	0.585		
		Total	23.40	39			
	Post	Between Groups	2.07	3	0.692	1.316	0.284
		Within Groups	18.92	36	0.526		
		Total	21.00	39			
L trap	Pre	Between Groups	2.59	3	0.864	1.189	0.328
		Within Groups	26.17	36	0.727		
		Total	28.77	39			
	Post	Between Groups	1.89	3	0.630	1.090	0.366
		Within Groups	20.81	36	0.578		
		Total	22.70	39			
M deltoid	Pre	Between Groups	1.30	3	0.435	0.556	0.648
		Within Groups	28.14	36	0.782		
		Total	29.44	39			
	Post	Between Groups	0.92	3	0.307	0.563	0.643
		Within Groups	19.59	36	0.544		
		Total	20.51	39			
P deltoid	Pre	Between Groups	1.10	3	0.368	0.464	0.709
		Within Groups	28.56	36	0.793		
		Total	29.66	39			
	Post	Between Groups	1.83	3	0.611	0.911	0.445
		Within Groups	24.15	36	0.671		
		Total	25.98	39			
A deltoid	Pre	Between Groups	2.35	3	0.785	1.562	0.215
		Within Groups	18.08	36	0.502		
		Total	20.44	39			
	Post	Between Groups	2.48	3	0.828	1.388	0.262

Variable	Source of Variance		Sum of Squares	Df	Mean Square	F	Sig.
		Within Groups	21.47	36	0.596		
		Total	23.96	39			
Sholder Joint Flexibility	Pre	Between Groups	473.16	3	157.719	2.253	0.099
		Within Groups	2519.82	36	69.995		
		Total	2992.98	39			
	Post	Between Groups	516.52	3	172.175	2.526	0.073
		Within Groups	2453.38	36	68.149		
		Total	2969.90	39			
Dominant part (C7)	Pre	Between Groups	54.64	3	18.213	2.509	0.074
		Within Groups	261.34	36	7.259		
		Total	315.98	39			
	Post	Between Groups	60.28	3	20.093	2.198	0.105
		Within Groups	329.07	36	9.141		
		Total	389.34	39			
Dominant part (PSIS)	Pre	Between Groups	26.63	3	8.876	0.220	0.882
		Within Groups	1453.27	36	40.369		
		Total	1479.90	39			
	Post	Between Groups	93.98	3	31.326	0.710	0.553
		Within Groups	1589.00	36	44.139		
		Total	1682.98	39			

Table (14) shows the following results:

- 1- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the occupation. Where the value of statistical significance for VAS before using dry cupping was (0.343), which is greater than (0.05) and not statistically significant, and the value of statistical significance for VAS after using dry cupping was (0.308), which is greater than (0.05) and not statistically significant. This indicates that the change in VAS does not differ with different occupation levels.
- 2- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before using dry cupping that decrease delayed onset muscle soreness due to the occupation. Where the value of statistical significance for (U trapezius) before using dry cupping was (0.034), which is less than (0.05) and

statistically significant. To find the source of the differences the researcher used Scheffe Test as shown in table (15):

**Table (15): Scheffe test results for binary comparisons of the differences in the mean scores of the study sample on the pre-U trapezius due to the occupation.**

Variable	Comparisons	means	Worker	Employee
pre-U trapezius	Trainer	3.16	0.50*	0.71*
	Worker	2.66	-----	0.21
	Employee	2.45	-----	-----

\* The mean difference is significant at the 0.05 level.

From Table (15), the binary comparisons indicate that the differences in the averages of the study sample before using dry cupping to reduce delayed onset muscle soreness with (U trapezius) due to occupation were between the trainer on the one hand and the worker and the employee on the other hand, in favor of the trainer.

Also, from table (14) it was found that there are no differences that are statistically significant after using dry cupping that decrease delayed onset muscle soreness due to the occupation. The value of statistical significance for (U trapezius) after using dry cupping was (0.284), which is greater than (0.05) and not statistically significant. This indicates that the change in (U trapezius) does not differ with different occupation levels. That is, the use of dry cupping reduces delayed onset muscle pain for (U trapezius) according to the person's occupation.

- 3- There are no statistically significant differences level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the occupation. Where the value of statistical significance for M trap before using dry cupping was (0.281), which is greater than (0.05) and not statistically significant, and the value of statistical significance for M trap after using dry cupping was (0.284), which is greater than (0.05) and not statistically significant. This indicates that the change in M trap does not differ with different occupation levels.
- 4- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the occupation. Where the value of statistical

significance for L trap before using dry cupping was (0.328), which is greater than (0.05) and not statistically significant, and the value of statistical significance for L trap after using dry cupping was (0.366), which is greater than (0.05) and not statistically significant. This indicates that the change in L trap does not differ with different occupation levels.

- 5- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the occupation. The significance level for statistical significance for M deltoid before using dry cupping was (0.648), which is greater than (0.05) and not statistically significant, and the value of statistical significance for M deltoid after using dry cupping was (0.643), which is greater than (0.05) and not statistically significant. This indicates that the change in M deltoid does not differ with different occupation levels.
- 6- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the occupation. The significance level for statistical significance for P deltoid before using dry cupping was (0.709), which is greater than (0.05) and not statistically significant, and the value of statistical significance for P deltoid after using dry cupping was (0.445), which is greater than (0.05) and not statistically significant. This indicates that the change in P deltoid does not differ with different occupation levels.
- 7- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the occupation. The significance level for statistical significance for A deltoid before using dry cupping was (0.215), which is greater than (0.05) and not statistically significant, and the value of statistical significance for A deltoid after using dry cupping was (0.262), which is greater than (0.05) and not statistically significant. This indicates that the change in A deltoid does not differ with different occupation levels.
- 8- There are no statistically significant differences on level (0.05) in the averages of the scores of the respondents before and after using dry cupping that increase shoulder

joint flexibility among bodybuilders due to the occupation. The significance level for statistical significance for shoulder joint flexibility (distance) before using dry cupping was (0.099), which is greater than (0.05) and not statistically significant, and the value of statistical significance for shoulder joint flexibility (distance) after using dry cupping was (0.073), which is greater than (0.05) and not statistically significant. This indicates that the change in shoulder joint flexibility (distance) does not differ with different occupation levels.

- 9- There are no statistically significant differences on level (0.05) in the averages of the scores of the respondents before and after using dry cupping that shoulder joint flexibility among bodybuilders due to the occupation. The significance level for statistical significance for dominant part (C7) before using dry cupping was (0.074), which is greater than (0.05) and not statistically significant, and the value of statistical significance for dominant part (C7) after using dry cupping was (0.105), which is greater than (0.05) and not statistically significant. This indicates that the change in dominant part (C7) does not differ with different occupation levels.
- 10- There are no statistically significant differences on level (0.05) in the averages of the scores of the respondents before and after using dry cupping that shoulder joint flexibility among bodybuilders due to the occupation. The significance level for statistical significance for dominant part (PSIS) before using dry cupping was (0.882), which is greater than (0.05) and not statistically significant, and the value of statistical significance for dominant part (PSIS) after using dry cupping was (0.553), which is greater than (0.05) and not statistically significant. This indicates that the change in dominant part (PSIS) does not differ with different occupation levels.

**5<sup>th</sup> hypothesis: There were no statistically significant differences at the significance level ( $\alpha \leq 0.05$ ) in the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the degree.**

One-Way ANOVA test was conducted to compare the average of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the degree.

**Table (16): Means, Standard Deviation, conducted to compare the average of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the degree.**

Variable		Degree	N	Pre		Post	
				mean	Std.	mean	Std.
VAS	Tawjihi		17	5.06	1.30	3.32	1.72
	BA		21	5.88	1.34	4.40	1.33
	MA		2	5.00	1.41	2.00	0.00
	Total		40	5.49	1.36	3.83	1.61
Pain Pressure Threshold Measurement	U trapezius	Tawjihi	17	2.67	0.68	2.84	0.69
		BA	21	2.69	0.71	3.13	0.63
		MA	2	3.15	1.20	3.65	0.92
		Total	40	2.70	0.70	3.03	0.68
	M trap	Tawjihi	17	3.01	0.70	3.42	0.75
		BA	21	2.95	0.83	3.37	0.72
		MA	2	3.35	1.20	3.90	1.13
		Total	40	3.00	0.77	3.42	0.73
	L trap	Tawjihi	17	3.04	0.97	3.50	0.86
		BA	21	3.28	0.77	3.66	0.69
		MA	2	3.90	0.57	4.20	0.71
		Total	40	3.21	0.86	3.62	0.76
	M deltoid	Tawjihi	17	3.06	0.94	3.49	0.80
		BA	21	3.04	0.83	3.49	0.67
		MA	2	3.90	0.42	4.20	0.57
		Total	40	3.10	0.87	3.52	0.73
	P deltoid	Tawjihi	17	3.31	0.89	3.68	0.86
		BA	21	2.97	0.87	3.39	0.78

Variable	Degree	N	Pre		Post		
			mean	Std.	mean	Std.	
A deltoid	MA	2	3.75	0.35	4.15	0.64	
	Total	40	3.15	0.87	3.55	0.82	
	Tawjihi	17	2.56	0.71	3.02	0.73	
	BA	21	2.59	0.78	3.04	0.87	
	MA	2	2.85	0.21	3.25	0.35	
	Total	40	2.59	0.72	3.04	0.78	
	Sholder Joint Flexibility	Tawjihi	17	24.88	11.06	20.82	11.28
	BA	21	21.19	6.12	16.10	5.40	
MA	2	25.50	12.02	23.00	9.90		
Total	40	22.98	8.76	18.45	8.73		
Dominant part (C7)	Tawjihi	17	7.41	3.22	9.44	3.80	
BA	21	7.52	2.44	9.48	2.66		
MA	2	3.50	0.71	6.50	0.71		
Total	40	7.28	2.85	9.31	3.16		
Dominant part (PSIS)	Tawjihi	17	24.71	6.93	28.24	7.88	
BA	21	25.43	5.80	29.81	5.70		
MA	2	24.00	5.66	27.50	3.54		
Total	40	25.05	6.16	29.03	6.57		

\* There is only one student, so he was excluded from this hypothesis.

Through the data presented in table (16), it is clear that there are apparent differences between the mean scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the degree. To check the significance of the differences, the researcher use One-Way Anova test as shows in table (17).

**Table (17): One-Way ANOVA to check the differences in the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the degree.**

Variable	Source of Variance		Sum of Squares	df	Mean Square	F	Sig.
VAS	Pre	Between Groups	6.85	2	3.425	1.953	0.156
		Within Groups	64.89	37	1.754		
		Total	71.74	39			
	Post	Between Groups	17.99	2	8.997	4.022	0.026
		Within Groups	82.78	37	2.237		
		Total	100.78	39			
U trapezius	Pre	Between Groups	0.42	2	0.212	0.418	0.661
		Within Groups	18.75	37	0.507		
		Total	19.17	39			
	Post	Between Groups	1.64	2	0.819	1.853	0.171
		Within Groups	16.35	37	0.442		
		Total	17.99	39			
M trap	Pre	Between Groups	0.29	2	0.146	0.234	0.793
		Within Groups	23.11	37	0.625		
		Total	23.40	39			
	Post	Between Groups	0.51	2	0.255	0.461	0.634
		Within Groups	20.49	37	0.554		
		Total	21.00	39			
L trap	Pre	Between Groups	1.58	2	0.788	1.073	0.353
		Within Groups	27.19	37	0.735		
		Total	28.77	39			
	Post	Between Groups	0.95	2	0.473	0.805	0.455
		Within Groups	21.75	37	0.588		
		Total	22.70	39			
M deltoid	Pre	Between Groups	1.37	2	0.684	0.902	0.414
		Within Groups	28.07	37	0.759		
		Total	29.44	39			
	Post	Between Groups	0.97	2	0.483	0.915	0.409
		Within Groups	19.54	37	0.528		
		Total	20.51	39			
P deltoid	Pre	Between Groups	1.84	2	0.919	1.223	0.306
		Within Groups	27.82	37	0.752		
		Total	29.66	39			
	Post	Between Groups	1.58	2	0.792	1.202	0.312
		Within Groups	24.40	37	0.659		
		Total	25.98	39			
A deltoid	Pre	Between Groups	0.15	2	0.073	0.134	0.875
		Within Groups	20.29	37	0.548		
		Total	20.44	39			
	Post	Between Groups	0.09	2	0.046	0.072	0.931

Variable	Source of Variance		Sum of Squares	df	Mean Square	F	Sig.
		Within Groups	23.87	37	0.645		
		Total	23.96	39			
Sholder Joint Flexibility	Pre	Between Groups	141.47	2	70.736	0.918	0.408
		Within Groups	2851.50	37	77.068		
		Total	2992.98	39			
	Post	Between Groups	253.62	2	126.810	1.727	0.192
		Within Groups	2716.28	37	73.413		
		Total	2969.90	39			
Dominant part (C7)	Pre	Between Groups	30.12	2	15.060	1.949	0.157
		Within Groups	285.86	37	7.726		
		Total	315.98	39			
	Post	Between Groups	16.66	2	8.332	0.827	0.445
		Within Groups	372.68	37	10.072		
		Total	389.34	39			
Dominant part (PSIS)	Pre	Between Groups	7.23	2	3.614	0.091	0.913
		Within Groups	1472.67	37	39.802		
		Total	1479.90	39			
	Post	Between Groups	28.18	2	14.089	0.315	0.732
		Within Groups	1654.80	37	44.724		
		Total	1682.98	39			

Table (17) shows the following results:

- 1- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before using dry cupping that decrease delayed onset muscle soreness due to the degree. The significance level for statistical significance for VAS before using dry cupping was (0.156), which is greater than (0.05) and not statistically significant. There were differences that are statistically significant on level (0.05) in the average of the scores of the respondents after using dry cupping that decrease delayed onset muscle soreness due to the degree, the value of statistical significance for VAS after using dry cupping was (0.026), which is less than (0.05) and statistically significant. This indicates that the change in VAS was differ with different degree levels. To find the source of the differences the researcher used Scheffe Test as shown in table (18):

**Table (18): Scheffe test results for binary comparisons of the differences in the mean scores of the study sample on the post-VAS due to the degree.**

Variable	Comparisons	means	BA	MA
Post-VAS	Tawjihi	3.32	-1.08*	1.32*
	BA	4.40	-----	2.40*
	MA	2.00	-----	-----

\* The mean difference is significant at the 0.05 level.

From Table (18), the binary comparisons indicate that the differences in the averages of the study sample after using dry cupping to reduce delayed onset muscle soreness with (VAS) due to the degree were between (Tawjihi and MA) on the one hand and (BA) on the other hand, in favor of whom (BA) degree.

- 2- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the degree. The significance level for statistical significance for (U trapezius) before using dry cupping was (0.661), which is greater than (0.05) and not statistically significant. And the value of statistical significance for (U trapezius) after using dry cupping was (0.171), which is greater than (0.05) and not statistically significant. This indicates that the change in (U trapezius) does not differ with different degree levels.
- 3- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the degree. The significance level for statistical significance for M trap before using dry cupping was (0.793), which is greater than (0.05) and not statistically significant, and the value of statistical significance for M trap after using dry cupping was (0.934), which is greater than (0.05) and not statistically significant. This indicates that the change in M trap does not differ with different degree levels.
- 4- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the degree. The significance level for statistical significance for L trap before using dry cupping was (0.353), which is greater than

(0.05) and not statistically significant, and the value of statistical significance for L trap after using dry cupping was (0.455), which is greater than (0.05) and not statistically significant. This indicates that the change in L trap does not differ with different degree levels.

- 5- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the degree. The significance level for statistical significance for M deltoid before using dry cupping was (0.414), which is greater than (0.05) and not statistically significant, and the value of statistical significance for M deltoid after using dry cupping was (0.409), which is greater than (0.05) and not statistically significant. This indicates that the change in M deltoid does not differ with different degree levels.
- 6- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the degree. The significance level for statistical significance for P deltoid before using dry cupping was (0.306), which is greater than (0.05) and not statistically significant, and the value of statistical significance for P deltoid after using dry cupping was (0.312), which is greater than (0.05) and not statistically significant. This indicates that the change in P deltoid does not differ with different degree levels.
- 7- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the degree. The significance level for statistical significance for A deltoid before using dry cupping was (0.875), which is greater than (0.05) and not statistically significant, and the value of statistical significance for A deltoid after using dry cupping was (0.931), which is greater than (0.05) and not statistically significant. This indicates that the change in A deltoid does not differ with different degree levels.
- 8- There are no statistically significant differences on level (0.05) in the averages of the scores of the respondents before and after using dry cupping that increase shoulder joint flexibility among bodybuilders due to the degree. The significance level for

statistical significance for sholder joint flexibility (distance) before using dry cupping was (0.408), which is greater than (0.05) and not statistically significant, and the value of statistical significance for sholder joint flexibility (distance) after using dry cupping was (0.192), which is greater than (0.05) and not statistically significant. This indicates that the change in sholder joint flexibility (distance) does not differ with different degree levels.

- 9- There are no statistically significant differences on level (0.05) in the averages of the scores of the respondents before and after using dry cupping that shoulder joint flexibility among bodybuilders due to the degree. The significance level for statistical significance for dominant part (C7) before using dry cupping was (0.157), which is greater than (0.05) and not statistically significant, and the value of statistical significance for dominant part (C7) after using dry cupping was (0.445), which is greater than (0.05) and not statistically significant. This indicates that the change in dominant part (C7) does not differ with different degree levels.
- 10- There are no statistically significant differences on level (0.05) in the averages of the scores of the respondents before and after using dry cupping that shoulder joint flexibility among bodybuilders due to the degree. Where the value of statistical significance for dominant part (PSIS) before using dry cupping was (0.913), which is greater than (0.05) and not statistically significant, and the value of statistical significance for dominant part (PSIS) after using dry cupping was (0.732), which is greater than (0.05) and not statistically significant. This indicates that the change in dominant part (PSIS) does not differ with different degree levels.

**6<sup>th</sup> hypothesis: There were no statistically significant differences at the significance level ( $\alpha \leq 0.05$ ) in the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the habits smoking.**

An independent-samples t-test was used to compute the differences in the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the habits smoking, as showing in table (19):

**Table (19): An independent-samples t-test was conducted to compare averages of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the habits smoking.**

Variable	Application	Habits smoking	N	mean	Std.	(T) value	Sig.
VAS	Pretest	no	14	5.43	1.40	-0.199	0.843
		yes	26	5.52	1.36		
	Posttest	no	14	3.32	1.37	-1.476	0.148
		yes	26	4.10	1.69		
U trapezius	Pretest	no	14	2.99	0.82	1.994	0.053
		yes	26	2.55	0.59		
	Posttest	no	14	3.35	0.78	2.284	0.028*
		yes	26	2.86	0.56		
M trap	Pretest	no	14	3.30	0.80	1.886	0.067
		yes	26	2.83	0.72		
	Posttest	no	14	3.70	0.80	1.841	0.073
		yes	26	3.27	0.66		
L trap	Pretest	no	14	3.53	0.84	1.783	0.083
		yes	26	3.03	0.83		
	Posttest	no	14	3.97	0.56	2.264	0.029*
		yes	26	3.43	0.80		
M deltoid	Pretest	no	14	3.44	0.77	1.921	0.062
		yes	26	2.91	0.87		
	Posttest	no	14	3.80	0.65	1.828	0.075

Variable	Application	Habits smoking	N	mean	Std.	(T) value	Sig.
		yes	26	3.37	0.73		
P deltoid	Pretest	no	14	3.22	0.82	0.376	0.709
		yes	26	3.11	0.91		
	Posttest	no	14	3.72	0.79	0.974	0.336
		yes	26	3.46	0.83		
A deltoid	Pretest	no	14	2.81	0.68	1.410	0.167
		yes	26	2.47	0.73		
	Posttest	no	14	3.32	0.59	1.690	0.099
		yes	26	2.89	0.84		
Sholder Joint Flexibility (distance)	Pretest	no	14	24.43	9.95	0.766	0.448
		yes	26	22.19	8.15		
	Posttest	no	14	19.07	8.83	0.327	0.746
		yes	26	18.12	8.83		
Dominant part (C7)	Pretest	no	14	6.57	2.68	-1.152	0.257
		yes	26	7.65	2.91		
	Posttest	no	14	9.25	2.95	-0.091	0.928
		yes	26	9.35	3.32		
Dominant part (PSIS)	Pretest	no	14	23.93	4.70	-0.842	0.405
		yes	26	25.65	6.83		
	Posttest	no	14	28.43	5.20	-0.417	0.679
		yes	26	29.35	7.28		

\* Statistically significant at (0.05), \*\* statistically significant at (0.01)

Table (19) shows the following results:

- 1- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before using dry cupping that decrease delayed onset muscle soreness due to the habits smoking. The significance level for statistical significance for VAS before using dry cupping was (0.843), which is greater than (0.05) and not statistically significant. And the value of statistical significance for VAS after using dry cupping was (0.148), which is greater than (0.05) and not statistically significant. This indicates that the change in VAS does not differ with different habits smoking.

- 2- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the habits smoking. The significance level for statistical significance for (U trapezius) before using dry cupping was (0.053), which is greater than (0.05) and not statistically significant. But there were differences that are statistically significant on level (0.05) in the average of the scores of the respondents after using dry cupping that decrease delayed onset muscle soreness due to the habits smoking, the value of statistical significance for (U trapezius) after using dry cupping was (0.028), which is less than (0.05) and statistically significant, in favor of non-smokers. This indicates that the change in (U trapezius) was differ with different habits smoking.
- 3- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the habits smoking. Where the value of statistical significance for M trap before using dry cupping was (0.067), which is greater than (0.05) and not statistically significant, and the value of statistical significance for M trap after using dry cupping was (0.073), which is greater than (0.05) and not statistically significant. This indicates that the change in M trap does not differ with different habits smoking.
- 4- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the habits smoking. Where the value of statistical significance for L trap before using dry cupping was (0.083), which is greater than (0.05) and not statistically significant. But there were differences that are statistically significant on level (0.05) in the average of the scores of the respondents after using dry cupping that decrease delayed onset muscle soreness due to the habits smoking, the value of statistical significance for L trap after using dry cupping was (0.029), which is greater than (0.05) and statistically significant, in favor of non-smoking. This indicates that the change in L trap was differ with different habits smoking.
- 5- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed

onset muscle soreness due to the habits smoking. Where the value of statistical significance for M deltoid before using dry cupping was (0.062), which is greater than (0.05) and not statistically significant, and the value of statistical significance for M deltoid after using dry cupping was (0.075), which is greater than (0.05) and not statistically significant. This indicates that the change in M deltoid does not differ with different habits smoking.

- 6- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the habits smoking. Where the value of statistical significance for P deltoid before using dry cupping was (0.709), which is greater than (0.05) and not statistically significant, and the value of statistical significance for P deltoid after using dry cupping was (0.336), which is greater than (0.05) and not statistically significant. This indicates that the change in P deltoid does not differ with different habits smoking.
- 7- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the habits smoking. Where the value of statistical significance for A deltoid before using dry cupping was (0.167), which is greater than (0.05) and not statistically significant, and the value of statistical significance for A deltoid after using dry cupping was (0.099), which is greater than (0.05) and not statistically significant. This indicates that the change in A deltoid does not differ with different habits smoking.
- 8- There are no differences that are statistically significant on level (0.05) in the averages of the scores of the respondents before and after using dry cupping that increase shoulder joint flexibility among bodybuilders due to the habits smoking. Where the value of statistical significance for sholder joint flexibility (distance) before using dry cupping was (0.448), which is greater than (0.05) and not statistically significant, and the value of statistical significance for sholder joint flexibility (distance) after using dry cupping was (0.746), which is greater than (0.05) and not statistically significant. This indicates that the change in sholder joint flexibility (distance) does not differ with different habits smoking.

- 9- There are no differences that are statistically significant on level (0.05) in the averages of the scores of the respondents before and after using dry cupping that shoulder joint flexibility among bodybuilders due to the habits smoking. Where the value of statistical significance for dominant part (C7) before using dry cupping was (0.257), which is greater than (0.05) and not statistically significant, and the value of statistical significance for dominant part (C7) after using dry cupping was (0.928), which is greater than (0.05) and not statistically significant. This indicates that the change in dominant part (C7) does not differ with different habits smoking.
- 10- There are no statistically significant differences on level (0.05) in the averages of the scores of the respondents before and after using dry cupping that shoulder joint flexibility among bodybuilders due to the habits smoking. Where the value of statistical significance for dominant part (PSIS) before using dry cupping was (0.405), which is greater than (0.05) and not statistically significant, and the value of statistical significance for dominant part (PSIS) after using dry cupping was (0.679), which is greater than (0.05) and not statistically significant. This indicates that the change in dominant part (PSIS) does not differ with different habits smoking.

**7<sup>th</sup> hypothesis: There were no statistically significant differences at the significance level ( $\alpha \leq 0.05$ ) in the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the habits' alcohol.**

An independent-samples t-test was used to compute the differences in the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the habits' alcohol, as showing in table (20):

**Table (20): An independent-samples t-test was conducted to compare averages of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the habits' alcohol.**

Variable	Application	Habits' alcohol	N	mean	Std.	(T) value	Sig.
VAS	Pretest	no	38	5.49	1.35	-0.013	0.990
		yes	2	5.50	2.12		
	Posttest	no	38	3.82	1.58	-0.156	0.877
		yes	2	4.00	2.83		
U trapezius	Pretest	no	38	2.71	0.71	0.210	0.835
		yes	2	2.60	0.85		
	Posttest	no	38	3.04	0.68	0.386	0.702
		yes	2	2.85	0.92		
M trap	Pretest	no	38	3.01	0.79	0.454	0.652
		yes	2	2.75	0.35		
	Posttest	no	38	3.42	0.75	0.132	0.896
		yes	2	3.35	0.21		
L trap	Pretest	no	38	3.20	0.86	-0.321	0.750
		yes	2	3.40	1.13		
	Posttest	no	38	3.61	0.76	-0.249	0.805
		yes	2	3.75	1.06		
M deltoid	Pretest	no	38	3.11	0.89	0.571	0.571
		yes	2	2.75	0.35		
	Posttest	no	38	3.54	0.74	0.540	0.592
		yes	2	3.25	0.35		
P deltoid	Pretest	no	38	3.12	0.89	-0.829	0.413
		yes	2	3.65	0.21		
	Posttest	no	38	3.53	0.83	-0.796	0.431
		yes	2	4.00	0.00		
A deltoid	Pretest	no	38	2.61	0.74	0.576	0.568
		yes	2	2.30	0.28		
	Posttest	no	38	3.07	0.80	0.816	0.420
		yes	2	2.60	0.00		
Sholder Joint Flexibility (distance)	Pretest	no	38	22.82	8.89	-0.496	0.623
		yes	2	26.00	7.07		

Variable	Application	Habits' alcohol	N	mean	Std.	(T) value	Sig.
	Posttest	no	38	18.34	8.88	-0.337	0.738
		yes	2	20.50	6.36		
Dominant part (C7)	Pretest	no	38	7.21	2.91	-0.619	0.539
		yes	2	8.50	0.71		
	Posttest	no	38	9.28	3.23	-0.312	0.757
		yes	2	10.00	1.41		
Dominant part (PSIS)	Pretest	no	38	24.97	6.31	-0.338	0.737
		yes	2	26.50	0.71		
	Posttest	no	38	28.89	6.69	-0.542	0.591
		yes	2	31.50	3.54		

\* Statistically significant at (0.05), \*\* statistically significant at (0.01)

Table (20) shows the following results:

- 1- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the habits' alcohol. Where the value of statistical significance for VAS before using dry cupping was (0.990), which is greater than (0.05) and not statistically significant. And the value of statistical significance for VAS after using dry cupping was (0.877), which is greater than (0.05) and not statistically significant. This indicates that the change in VAS does not differ with different habits' alcohol.
- 2- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the habits' alcohol. Where the value of statistical significance for (U trapezius) before using dry cupping was (0.835), which is greater than (0.05) and not statistically significant, and the value of statistical significance for (U trapezius) after using dry cupping was (0.702), which is greater than (0.05) and not statistically significant. This indicates that the change in (U trapezius) does not differ with different habits' alcohol.

- 3- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the habits' alcohol. The significance level for statistical significance for M trap before using dry cupping was (0.652), which is greater than (0.05) and not statistically significant, and the value of statistical significance for M trap after using dry cupping was (0.896), which is greater than (0.05) and not statistically significant. This indicates that the change in M trap does not differ with different habits' alcohol.
- 4- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the habits' alcohol. Where the value of statistical significance for L trap before using dry cupping was (0.750), which is greater than (0.05) and not statistically significant, and the value of statistical significance for L trap after using dry cupping was (0.805), which is greater than (0.05) and not statistically significant. This indicates that the change in L trap does not differ with different habits' alcohol.
- 5- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the habits' alcohol. Where the value of statistical significance for M deltoid before using dry cupping was (0.571), which is greater than (0.05) and not statistically significant, and the value of statistical significance for M deltoid after using dry cupping was (0.592), which is greater than (0.05) and not statistically significant. This indicates that the change in M deltoid does not differ with different habits' alcohol.
- 6- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the habits' alcohol. Where the value of statistical significance for P deltoid before using dry cupping was (0.413), which is greater than (0.05) and not statistically significant, and the value of statistical significance for P deltoid after using dry cupping was (0.431), which is greater than (0.05) and not

statistically significant. This indicates that the change in P deltoid does not differ with different habits' alcohol.

- 7- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the habits' alcohol. Where the value of statistical significance for A deltoid before using dry cupping was (0.568), which is greater than (0.05) and not statistically significant, and the value of statistical significance for A deltoid after using dry cupping was (0.420), which is greater than (0.05) and not statistically significant. This indicates that the change in A deltoid does not differ with different habits' alcohol.
- 8- There are no statistically significant differences on level (0.05) in the averages of the scores of the respondents before and after using dry cupping that increase shoulder joint flexibility among bodybuilders due to the habits' alcohol. Where the value of statistical significance for sholder joint flexibility (distance) before using dry cupping was (0.623), which is greater than (0.05) and not statistically significant, and the value of statistical significance for sholder joint flexibility (distance) after using dry cupping was (0.738), which is greater than (0.05) and not statistically significant. This indicates that the change in sholder joint flexibility (distance) does not differ with different habits' alcohol.
- 9- There are no statistically significant differences on level (0.05) in the averages of the scores of the respondents before and after using dry cupping that shoulder joint flexibility among bodybuilders due to the habits' alcohol. The significance level for statistical significance for dominant part (C7) before using dry cupping was (0.539), which is greater than (0.05) and not statistically significant, and the value of statistical significance for dominant part (C7) after using dry cupping was (0.757), which is greater than (0.05) and not statistically significant. This indicates that the change in dominant part (C7) does not differ with different habits' alcohol.
- 10- There are no statistically significant differences on level (0.05) in the averages of the scores of the respondents before and after using dry cupping that shoulder joint flexibility among bodybuilders due to the habits' alcohol. Where the value of statistical significance for dominant part (PSIS) before using dry cupping was (0.737), which is

greater than (0.05) and not statistically significant, and the value of statistical significance for dominant part (PSIS) after using dry cupping was (0.591), which is greater than (0.05) and not statistically significant. This indicates that the change in dominant part (PSIS) does not differ with different habits' alcohol.

**8<sup>th</sup> hypothesis: There were no statistically significant differences at the significance level ( $\alpha \leq 0.05$ ) in the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the habits' hormone.**

An independent-samples t-test was used to compute the differences in the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the habits' hormone, as showing in table (21):

**Table (21): An independent-samples t-test was conducted to compare averages of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the habits' hormone.**

Variable	Application	Habits' hormone	N	mean	Std.	(T) value	Sig.
VAS	Pretest	no	36	5.40	1.34	-1.192	0.241
		yes	4	6.25	1.50		
	Posttest	no	36	3.75	1.64	-0.883	0.383
		yes	4	4.50	1.29		
U trapezius	Pretest	no	36	2.72	0.70	0.454	0.653
		yes	4	2.55	0.76		
	Posttest	no	36	3.03	0.69	0.023	0.982
		yes	4	3.03	0.60		
M trap	Pretest	no	36	3.04	0.79	1.007	0.320
		yes	4	2.63	0.63		
	Posttest	no	36	3.45	0.75	0.910	0.368
		yes	4	3.10	0.52		

Variable	Application	Habits' hormone	N	mean	Std.	(T) value	Sig.
L trap	Pretest	no	36	3.23	0.90	0.382	0.704
		yes	4	3.05	0.45		
	Posttest	no	36	3.64	0.80	0.458	0.649
		yes	4	3.45	0.26		
M deltoid	Pretest	no	36	3.12	0.88	0.468	0.642
		yes	4	2.90	0.84		
	Posttest	no	36	3.53	0.74	0.280	0.781
		yes	4	3.43	0.59		
P deltoid	Pretest	no	36	3.18	0.88	0.539	0.593
		yes	4	2.93	0.85		
	Posttest	no	36	3.55	0.85	0.000	1.000
		yes	4	3.55	0.53		
A deltoid	Pretest	no	36	2.61	0.67	0.403	0.689
		yes	4	2.45	1.27		
	Posttest	no	36	3.06	0.75	0.312	0.756
		yes	4	2.93	1.21		
Sholder Joint Flexibility (distance)	Pretest	no	36	23.19	9.04	0.471	0.641
		yes	4	21.00	6.16		
	Posttest	no	36	18.75	8.91	0.647	0.521
		yes	4	15.75	7.23		
Dominant part (C7)	Pretest	no	36	7.14	2.87	-0.905	0.371
		yes	4	8.50	2.65		
	Posttest	no	36	9.21	3.22	-0.621	0.539
		yes	4	10.25	2.75		
Dominant part (PSIS)	Pretest	no	36	25.14	6.06	0.271	0.788
		yes	4	24.25	7.97		
	Posttest	no	36	29.03	6.51	0.008	0.994
		yes	4	29.00	8.12		

\* Statistically significant at (0.05), \*\* statistically significant at (0.01)

Table (21) shows the following results:

- 1- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed

onset muscle soreness due to the habits' hormone. Where the value of statistical significance for VAS before using dry cupping was (0.241), which is greater than (0.05) and not statistically significant. And the value of statistical significance for VAS after using dry cupping was (0.383), which is greater than (0.05) and not statistically significant. This indicates that the change in VAS does not differ with different habits' hormone.

- 2- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the habits' hormone. Where the value of statistical significance for (U trapezius) before using dry cupping was (0.653), which is greater than (0.05) and not statistically significant, and the value of statistical significance for (U trapezius) after using dry cupping was (0.982), which is greater than (0.05) and not statistically significant. This indicates that the change in (U trapezius) does not differ with different habits' hormone.
- 3- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the habits' hormone. Where the value of statistical significance for M trap before using dry cupping was (0.320), which is greater than (0.05) and not statistically significant, and the value of statistical significance for M trap after using dry cupping was (0.368), which is greater than (0.05) and not statistically significant. This indicates that the change in M trap does not differ with different habits' hormone.
- 4- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the habits' hormone. Where the value of statistical significance for L trap before using dry cupping was (0.704), which is greater than (0.05) and not statistically significant, and the value of statistical significance for L trap after using dry cupping was (0.649), which is greater than (0.05) and not statistically significant. This indicates that the change in L trap does not differ with different habits' hormone.

- 5- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the habits' hormone. Where the value of statistical significance for M deltoid before using dry cupping was (0.642), which is greater than (0.05) and not statistically significant, and the value of statistical significance for M deltoid after using dry cupping was (0.781), which is greater than (0.05) and not statistically significant. This indicates that the change in M deltoid does not differ with different habits' hormone.
- 6- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the habits' hormone. The significance level for statistical significance for P deltoid before using dry cupping was (0.593), which is greater than (0.05) and not statistically significant, and the value of statistical significance for P deltoid after using dry cupping was (1.00), which is greater than (0.05) and not statistically significant. This indicates that the change in P deltoid does not differ with different habits' hormone.
- 7- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the habits' hormone. The significance level for statistical significance for A deltoid before using dry cupping was (0.689), which is greater than (0.05) and not statistically significant, and the value of statistical significance for A deltoid after using dry cupping was (0.756), which is greater than (0.05) and not statistically significant. This indicates that the change in A deltoid does not differ with different habits' hormone.
- 8- There are no statistically significant differences on level (0.05) in the averages of the scores of the respondents before and after using dry cupping that increase shoulder joint flexibility among bodybuilders due to the habits' hormone. Where the value of statistical significance for sholder joint flexibility (distance) before using dry cupping was (0.641), which is greater than (0.05) and not statistically significant, and the value of statistical significance for sholder joint flexibility (distance) after using dry cupping was (0.521), which is greater than (0.05) and not statistically significant. This

indicates that the change in shoulder joint flexibility (distance) does not differ with different habits' hormone.

- 9- There are no statistically significant differences on level (0.05) in the averages of the scores of the respondents before and after using dry cupping that shoulder joint flexibility among bodybuilders due to the habits' hormone. The significance level for statistical significance for dominant part (C7) before using dry cupping was (0.371), which is greater than (0.05) and not statistically significant, and the value of statistical significance for dominant part (C7) after using dry cupping was (0.539), which is greater than (0.05) and not statistically significant. This indicates that the change in dominant part (C7) does not differ with different habits' hormone.
- 10- There are no statistically significant differences on level (0.05) in the averages of the scores of the respondents before and after using dry cupping that shoulder joint flexibility among bodybuilders due to the habits' hormone. Where the value of statistical significance for dominant part (PSIS) before using dry cupping was (0.788), which is greater than (0.05) and not statistically significant, and the value of statistical significance for dominant part (PSIS) after using dry cupping was (0.994), which is greater than (0.05) and not statistically significant. This indicates that the change in dominant part (PSIS) does not differ with different habits' hormone.

**9<sup>th</sup> hypothesis: There were no statistically significant differences at the significance level ( $\alpha \leq 0.05$ ) in the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the habits' steroids.**

An independent-samples t-test was used to compute the differences in the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the habits' steroids, as showing in table (21):

**Table (21): An independent-samples t-test was conducted to compare averages of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness and increase shoulder joint flexibility due to the habits' steroids.**

Variable	Application	Habits' steroids	N	mean	Std.	(T) value	Sig.
VAS	Pretest	no	38	5.49	1.35	-0.013	0.990
		yes	2	5.50	2.12		
	Posttest	no	38	3.79	1.61	-0.604	0.549
		yes	2	4.50	2.12		
U trapezius	Pretest	no	38	2.70	0.72	-0.097	0.923
		yes	2	2.75	0.35		
	Posttest	no	38	3.03	0.70	-0.248	0.805
		yes	2	3.15	0.21		
M trap	Pretest	no	38	3.02	0.79	0.926	0.361
		yes	2	2.50	0.00		
	Posttest	no	38	3.44	0.74	0.923	0.362
		yes	2	2.95	0.35		
L trap	Pretest	no	38	3.20	0.88	-0.238	0.813
		yes	2	3.35	0.35		
	Posttest	no	38	3.62	0.78	0.127	0.900
		yes	2	3.55	0.35		
M deltoid	Pretest	no	38	3.11	0.89	0.488	0.628
		yes	2	2.80	0.28		
	Posttest	no	38	3.54	0.73	0.741	0.463
		yes	2	3.15	0.49		
P deltoid	Pretest	no	38	3.19	0.88	1.170	0.249
		yes	2	2.45	0.07		
	Posttest	no	38	3.57	0.83	0.528	0.600
		yes	2	3.25	0.49		
A deltoid	Pretest	no	38	2.63	0.72	1.507	0.140
		yes	2	1.85	0.49		
	Posttest	no	38	3.08	0.78	1.490	0.145
		yes	2	2.25	0.35		
Sholder Joint Flexibility (distance)	Pretest	no	38	22.95	8.99	-0.086	0.932
		yes	2	23.50	2.12		

Variable	Application	Habits' steroids	N	mean	Std.	(T) value	Sig.
	Posttest	no	38	18.42	8.96	-0.090	0.929
		yes	2	19.00	1.41		
Dominant part (C7)	Pretest	no	38	7.32	2.90	0.391	0.698
		yes	2	6.50	2.12		
	Posttest	no	38	9.38	3.22	0.598	0.554
		yes	2	8.00	1.41		
Dominant part (PSIS)	Pretest	no	38	25.45	6.06	1.831	0.075
		yes	2	17.50	0.71		
	Posttest	no	38	29.39	6.53	1.581	0.122
		yes	2	22.00	0.00		

\* Statistically significant at (0.05), \*\* statistically significant at (0.01)

Table (21) shows the following results:

- 1- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the habits' steroids. Where the value of statistical significance for VAS before using dry cupping was (0.990), which is greater than (0.05) and not statistically significant. And the value of statistical significance for VAS after using dry cupping was (0.549), which is greater than (0.05) and not statistically significant. This indicates that the change in VAS does not differ with different habits' steroids.
- 2- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the habits' steroids. Where the value of statistical significance for (U trapezius) before using dry cupping was (0.923), which is greater than (0.05) and not statistically significant, and the value of statistical significance for (U trapezius) after using dry cupping was (0.805), which is greater than (0.05) and not statistically significant. This indicates that the change in (U trapezius) does not differ with different habits' steroids.

- 3- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the habits' steroids. The significance level for statistical significance for M trap before using dry cupping was (0.361), which is greater than (0.05) and not statistically significant, and the value of statistical significance for M trap after using dry cupping was (0.362), which is greater than (0.05) and not statistically significant. This indicates that the change in M trap does not differ with different habits' steroids.
- 4- There are no differences that are statistically significant on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the habits' steroids. Where the value of statistical significance for L trap before using dry cupping was (0.813), which is greater than (0.05) and not statistically significant, and the value of statistical significance for L trap after using dry cupping was (0.900), which is greater than (0.05) and not statistically significant. This indicates that the change in L trap does not differ with different habits' steroids.
- 5- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the habits' steroids. Where the value of statistical significance for M deltoid before using dry cupping was (0.628), which is greater than (0.05) and not statistically significant, and the value of statistical significance for M deltoid after using dry cupping was (0.463), which is greater than (0.05) and not statistically significant. This indicates that the change in M deltoid does not differ with different habits' steroids.
- 6- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the habits' steroids. Where the value of statistical significance for P deltoid before using dry cupping was (0.249), which is greater than (0.05) and not statistically significant, and the value of statistical significance for P deltoid after using dry cupping was (0.600), which is greater than (0.05) and not

statistically significant. This indicates that the change in P deltoid does not differ with different habits' steroids.

- 7- There are no statistically significant differences on level (0.05) in the average of the scores of the respondents before and after using dry cupping that decrease delayed onset muscle soreness due to the habits' steroids. Where the value of statistical significance for A deltoid before using dry cupping was (0.140), which is greater than (0.05) and not statistically significant, and the value of statistical significance for A deltoid after using dry cupping was (0.145), which is greater than (0.05) and not statistically significant. This indicates that the change in A deltoid does not differ with different habits' steroids.
- 8- There are no statistically significant differences on level (0.05) in the averages of the scores of the respondents before and after using dry cupping that increase shoulder joint flexibility among bodybuilders due to the habits' steroids. Where the value of statistical significance for sholder joint flexibility (distance) before using dry cupping was (0.932), which is greater than (0.05) and not statistically significant, and the value of statistical significance for sholder joint flexibility (distance) after using dry cupping was (0.929), which is greater than (0.05) and not statistically significant. This indicates that the change in sholder joint flexibility (distance) does not differ with different habits' steroids.
- 9- There are no statistically significant differences on level (0.05) in the averages of the scores of the respondents before and after using dry cupping that shoulder joint flexibility among bodybuilders due to the habits' steroids. Where the value of statistical significance for dominant part (C7) before using dry cupping was (0.698), which is greater than (0.05) and not statistically significant, and the value of statistical significance for dominant part (C7) after using dry cupping was (0.554), which is greater than (0.05) and not statistically significant. This indicates that the change in dominant part (C7) does not differ with different habits' steroids.
- 10- There are no statistically significant differences on level (0.05) in the averages of the scores of the respondents before and after using dry cupping that shoulder joint flexibility among bodybuilders due to the habits' steroids. The significance level for statistical significance for dominant part (PSIS) before using dry cupping was (0.075),

which is greater than (0.05) and not statistically significant, and the value of statistical significance for dominant part (PSIS) after using dry cupping was (0.122), which is greater than (0.05) and not statistically significant. This indicates that the change in dominant part (PSIS) does not differ with different habits' steroids.

# Chapter V

## Conclusion & Discussion

## Discussion

This study investigated the effect of dry cupping on reducing delayed muscle soreness and improving shoulder joint flexibility to understand how they relate to creating and maintaining a healthy lifestyle and preventing injuries among bodybuilders. This study is the first of its kind in Palestine, which is concerned with reducing delayed muscle soreness, increasing shoulder joint flexibility and how to effectively monitor them.

In the current study, it was found that dry cupping reduced delayed muscle pain among bodybuilders, which is consistent with the studies of AlKhadhrawi & Alshami (2019); Bridgett et al. (2018); Chiu et al. (2020); Salemi et al. (2021); Silva et al. (2019). This can be explained through the fact that dry cupping helps relieve the pain caused by training. In some cases, it helps to remove it completely by getting rid of lactic acid resulting from muscular effort during training and also works to increase the secretion of some Hormones such as (endorphins). It should be noted here that endorphins acts as a natural analgesic for pain, improves mood, and gives relaxation through mild pain resulting from tingling or scratches on the surface of the skin, as well as the negative withdrawal of the cupping.

In this regard, it was found that dry cupping can decrease delayed muscle soreness among bodybuilders. For instance, there are statistically significant differences between the pre and posttests of the effect of dry cupping on U trapezius, M trap, L trap, M deltoid, P deltoid, and A-deltoid among bodybuilders. This was in consistency with the studies of Salemi et al. (2021) and Silva et al. (2019); as it was clearly shown from such studies that there are statistically significant differences between the pre and posttests of the effect of dry cupping on muscle soreness among bodybuilders, through the use of (VAS).

Some studies have also debated and reported that dry cupping works in terms of getting rid of toxins, aging and dead blood cells, and sediments in the body resulting from taking some supplements and hormones, which would have strained the liver and kidneys in an attempt to get rid of them and prevent serious problems for them in the long run. Additionally, it increases blood flow to the muscles, speeds up recovery from injuries, and reduces inflammation resulting from great muscle effort. Therefore, it is considered one of the most important tools to creating and maintaining a healthy lifestyle and preventing injuries among bodybuilders.

In this same study, it was found that dry cupping can increase shoulder joint flexibility among bodybuilders. Needless to say, using dry cupping reduces the distance in the shoulder joint, which leads to an increase in its flexibility. The use of dry cupping increases the flexibility of the shoulder joint by increasing (PSIS) in the dominant part, and the difference was in favor of the post-test, meaning that an increase in (PSIS) of the dominant part leads to increased flexibility of the shoulder joint. This result is consistent with and supported by the study of Kang et al. (2021). This might be explained by the fact that dry cupping promotes hyperemia, or increased blood flow, to the cupped region. As a result of vasodilation and maybe mild sweating, a bodybuilder could feel warm and heated. Additionally, it helps with muscle relaxation, arteries and veins blood circulation, nervous system calmness, neck and back pain relief, anxiety relief, tiredness relief, and headache relief.

According to the current study, participants who followed the exercise plan were able to dramatically increase the mobility of their shoulder joints. The range of motion in the shoulder joint significantly improved, and the pain in the shoulder joint significantly improved. According to the study's findings, bodybuilders' health and performance may benefit from increased shoulder joint flexibility. Increased shoulder joint range of motion and decreased risk of shoulder joint injuries are both benefits of increased shoulder joint flexibility. Improved posture and balance as well as enhanced strength and power during upper body activities can result from this increased range of motion (Schwarzenegger and Dobbins, 1998).

The results of the current study showed that participants with more shoulder joint flexibility performed much better in bodybuilding than people with less shoulder joint flexibility, which is compatible with the study of Kang et al. (2021). It should be noted here that this shows a key component of getting the best possible bodybuilding performance is shoulder joint flexibility. In other words, there is a link between improved muscle strength and power and shoulder joint flexibility. As a result, it can enhance muscle power and strength, which are crucial components of good bodybuilding performance, proving that shoulder joint flexibility is a key part of a successful bodybuilding program. Bodybuilders must therefore keep up with and improve their performance.

Moreover, the results of this study showed that dry cupping significantly improved the bodybuilders' musculoskeletal recovery. This finding is in line with Bridgett et al. (2018). Several recent studies reported that rise in the quantity of repetitions performed during workouts and an increase in training volume were indicators of the bodybuilders' improved overall performance. According to the study's findings, dry cupping might be a useful and secure technique for enhancing musculoskeletal recovery and performance in bodybuilders.

It is worth mentioning here that this same study hypothesized that there were no statistically significant differences at the significance level ( $\alpha \leq 0.05$ ) in the scores of the respondents before and after using dry cupping that decrease delayed muscle soreness and increase shoulder joint flexibility due to the age. Age is not a main measurement to decrease delayed muscle soreness and increase shoulder joint flexibility among bodybuilders. The change in M trap, L trap, M deltoid, P deltoid, A deltoid, dominant parts (C7) and PSIS do not differ with different age, height, weight, occupation, degree levels. This was not in alignment with the finding of Nahon et al. (2021). Indeed, it was found that there are apparent differences between the mean scores of the respondents before and after using dry cupping that decrease delayed muscle soreness and increase shoulder joint flexibility due to the age. There is no doubt; however, our muscles weaken and shrink as we age, which can cause fatigue, weakness, and a reduced capacity for activity. This is caused by a variety of interconnected factors, such as shrinking and

thinning muscle fibers, the loss of muscular tissue, which is replaced with fibrous, stiff tissue that recovers more slowly. Additionally, alterations in the neurological system lead to a reduction in muscle tone and contraction power.

With that said, the results of the current study showed that the value of statistical significance for (U trapezius) before using dry cupping was less than (0.05). In other words, this indicates that the change in (U trapezius) differ with different age, occupation levels, which is inconsistent with the study of Chiu et al. (2020). Previous studies have reported that although there was a decline in the thickness of other muscles between different age groups, the trapezius muscles in the scapular muscles thinned dramatically with age. Regarding the functional alteration, scapular muscle activity and the ratio of deltoid to scapular muscular activity may not be impacted by age.

It is clearly noted in this current study that there were no statistically significant differences at the significance level ( $\alpha \leq 0.05$ ) in the scores of the respondents before and after using dry cupping that decrease delayed muscle soreness and increase shoulder joint flexibility, due to the occupation and the degree, which is inconsistent with the studies of Kang et al., 2021 and Vaidya et al., 2021.

Further, through the data presented in the aforementioned study, it is clearly noted that there are apparent differences between the mean scores of the respondents before and after using dry cupping that decrease delayed muscle soreness and increase shoulder joint flexibility due to the height, which is in line with the studies of (Ozmen et al. (2016), Schwarzenegger 1987). In this same study, it was shown that the change in VAS, (U trapezius), M trap, L trap, M deltoid, P deltoid, A deltoid, shoulder joint flexibility (distance), as well as those dominant parts (C7) and (PSIS) do not differ with different height levels.

Indeed, it was found that there were statistically significant differences at the significance level ( $\alpha \leq 0.05$ ) in the scores of the respondents before and after using dry cupping that decrease delayed muscle soreness and increase shoulder joint flexibility due to the weight; as it was noted that the change in VAS, (U trapezius), M trap, L trap, M deltoid, P deltoid, A deltoid, as well as those dominant parts (C7) and (PSIS) do not differ with different weight levels, except for the fact that the change in shoulder joint

flexibility (distance) was differed with different weight levels. This was in a clear alignment with the study of Chiu et al. (2020), but in contradiction with the studies of AlKhadhrawi & Alshami (2019); Bridgett et al. (2018); and Nahon et al. (2021).

In the current study, it's shown that there were no statistically significant differences at the significance level ( $\alpha \leq 0.05$ ) in the scores of the respondents before and after using dry cupping that decrease delayed muscle soreness and increase shoulder joint flexibility due to the smoking habits, habits' hormone, and habits' steroids. For instance, the change in VAS, M trap, M deltoid, shoulder joint flexibility (distance), P deltoid, A deltoid, dominant parts (C7) and PSIS do not differ with smoking habit. Whereas, the change in L trap and U trapezius differ with different smoking habits, which may differ from the results of the previous studies of (Imtiyaz et al., 2014; Kirmizigil et al. 2020; Ozmen et al. (2016), Schwarzenegger 1987). On the other hand, it is worth mentioning here that the change in VAS, M trap, M deltoid, shoulder joint flexibility (distance), P deltoid, A deltoid, L trap, U trapezius, dominant parts (C7) and PSIS do not differ with hormone, steroids, and alcohol habits.

The researcher believes that although there hasn't been much scientific research on these claims, dry cupping therapy is said to promote pain alleviation and range of motion (ROM), speed healing, reduce inflammation, improve athletic performance, and speed recovery. While some studies back up the claims, others contend that the evidence for cupping's benefits is equivocal. Dry cupping may lessen muscular soreness and be useful in recovery and rehabilitation settings if it may lower inflammation, relieve pain, increase range of motion, and shorten recovery times. Needless to say, dry cupping would improve dorsiflexion range of motion and lessen the consequences of calf muscle soreness.

Some previous research has demonstrated that the immediate effects of DMS on shoulder joint flexibility last for at least three days. It is crucial to remember that while DMS might affect the flexibility of the shoulder joint, this effect can be reduced with the appropriate dry cupping recovery method. Accordingly, the use of dry cupping therapy is crucial for reducing musculoskeletal discomfort and also helps with mobility, flexibility, and digestive issues. Cupping can also encourage face renewal and body firming for

cosmetic purposes. Myofascial decompression is a technique used to widen the range of motion. According to research, in those who are impacted, muscle fiber liberation has an impact on joint flexibility and greater range of motion (Markowski et al., 2014).

It was also found that there is a strong association between dry cupping and delayed muscle soreness and shoulder joint flexibility. Dry cupping helps stimulate the chemical breakdown of toxins, thus delaying muscle and tissue healing. Cupping therapy used with anterior knee pain can significantly improve passive and active range of motion. It reduces pain if it is used in the correct places where cupping is performed on the body. Further, the results show that cupping therapy not only improves range of motion, but also increases nerve conduction of the treated muscle and joint flexibility. This is supported by the study of (Mehta & Dhapte, 2015).

Our results were in agreement with Chiu et al. (2020) that found dry cupping helped reduce the signs and symptoms of myofascial pain syndrome and restore activity. However, previous evidence have primarily relied on subjective clinical symptoms to determine how well cupping reduces myofascial pain. In this regard, Myofascial pain syndrome is characterized by painful, tense muscular bands and particular hypersensitive places. The condition's mechanics are not precisely understood. This is most likely a result of the disease's intricacy, which incorporates coupling of excitation and contractility, neuromuscular input, regional circulation, and energy metabolism. Cupping may be used to regulate some of these systems, which could lessen the intensity of myofascial pain syndrome

The results of this study found that dry cupping may help decrease hypoxia and hemoglobin levels as well as boost hemoglobin levels. This enhances local oxygen intake and promotes blood microcirculation and circulatory activity, which is consistent with the study of Schafer et al. (2022). This could be related to the significant impact of sports cupping on the performance of bodybuilders. Dry cupping helps in increasing the efficiency of the small blood circulation, which increases the ability of red blood cells to carry more oxygen.

The pathophysiology of myofascial pain syndrome plays a significant part in the sympathetic nervous system's overactivity. Self-massage and at-home workouts can reportedly boost the parasympathetic nervous system's activity, while dry cupping can dramatically lessen the sympathetic skin reaction, according to certain studies. Any of the aforementioned treatments can help with myofascial pain syndrome. According to our earlier research, cupping the upper back can increase the impact of parasympathetic activity on heart rate variability. The process should therefore have effects and modes of action that are comparable to those of massage and dry needling. This could be the cause of the normal group's significant functional improvement in this study (AlKhadhrawi & Alsham, 2019).

This study had several limitations. First, there is no universally accepted criteria for the diagnosis of delayed muscle soreness and shoulder joint flexibility. Second, this study picked bodybuilders from the several Gyms in one city “Jenin” as participants in order to eliminate cupping therapy interference caused by differences in training courses and intensity. The small sample size is one of the limitations of this study because there were only forty bodybuilders who had delayed muscle pain and shoulder joint flexibility. Third, the researcher focused only on bodybuilders not any other kind of players in the West Bank mainly in Jenin. The present study included only studies of the importance of maintaining flexibility for bodybuilders and musculoskeletal conditions and sports-related injuries. The current study is conducted in Palestine, which can be considered a country from low-to-middle-income countries, so the findings cannot be generalized in the rich and high-income countries, because of the different social and health care systems. Findings of reviewed studies may not be directly comparable due to different tools used, varying domains and different definitions of variables. Since pain can vary from person to another, objective and functional measurements might yield more accurate results. This might have resulted in variations in soreness and the speed at which the discomfort subsided. All of which might have caused bias in the outcomes.

## **Future Recommendations**

Based on the results of this study, the researcher recommends the following:

1. This study opens up great prospects for the completion of scientific research with regard to the contributing factors, each separately. Accordingly, the researcher recommends for further researches with more profound and clear focus on each variable.
2. The study recommends decision-makers in the Ministry of Health to provide the necessary laboratory equipment in the laboratories of all government hospitals with complete independence for bodybuilders.
3. Activating the role of raising awareness of healthy nutrition and methods of protection from exposure to sports-related injuries among bodybuilders through different training courses.
4. Activating the role of media and propaganda through social media platforms to entice the individual to adhere to the healthy pattern to maintain the ideal weight and healthy lifestyle among bodybuilders.
5. The necessity to conduct a study that measure the effect of dry cupping on delayed onset muscle soreness and upper parts flexibility.
6. Additional studies may also examine sham cupping, which may be useful in concealing the procedure, particularly in people who have never had cupping.
7. Encouraging people mainly bodybuilders with persistent nonspecific low back pain to use dry cupping in improving pain and functional disability.
8. Plans and frameworks should be made to guide local health care officials in developing care systems for delayed onset muscle soreness and shoulder joint flexibility among bodybuilders throughout the continuum of care.
9. Continuous following up and providing information and advice to the bodybuilders about the strategies that can be followed to preventing injuries, creating and maintaining the lifestyle.

## Conclusion

Our study was about the effect of dry cupping on reducing delayed muscle soreness and improving shoulder joint flexibility. The results of this study showed that the use of dry cupping reduces the distance in the shoulder joint and eventually leads to an increase in its flexibility. It was also found that dry cupping significantly improved the bodybuilders general health. In other words, there is a strong association between dry cupping and delayed muscle soreness and shoulder joint flexibility. It was found through the use of a visual analog soreness scale that there are statistically significant differences between the pre and posttests of the effect of dry cupping on muscle soreness among bodybuilders. Additionally, it was showed that there are no differences that are statistically significant on level (0.05) in the averages of the scores of the respondents before and after using dry cupping that decrease delayed muscle soreness due to the age, height, weight, occupation, degree, smoking habits, and alcohol habits.

Muscle soreness is characterized as a temporary decline in the ability to carry out physical activity. The buildup of metabolites within the muscle and the production of insufficient motor commands by the motor cortex during exercise are two putative reasons of muscle exhaustion. Extreme muscle wear and tear can have a negative impact on joint stability, sports performance, and injury risk. Therefore, it's critical to offer efficient therapies to enhance the recovery from exercise-induced muscle exhaustion.

It should be noted here that it was found that dry cupping can decrease delayed muscle soreness among bodybuilders. It also can increase shoulder joint flexibility among bodybuilders, not to mention the fact that dry cupping significantly improved the bodybuilders' musculoskeletal recovery. In this study, it is clearly noted that there were no statistically significant differences at the significance level ( $\alpha \leq 0.05$ ) in the scores of the respondents before and after using dry cupping that decrease delayed muscle soreness and increase shoulder joint flexibility due to the age, the occupation and the degree, as well as smoking habits, habits' hormone, and habits' steroids. However, there are apparent differences between the mean scores of the respondents before and after using dry cupping that decrease delayed muscle soreness and increase shoulder joint flexibility due to the height. Besides, there were statistically significant differences at the significance level ( $\alpha \leq 0.05$ ) in the scores of the respondents before and after using dry cupping that decrease delayed muscle soreness and increase shoulder joint flexibility due to the weight.

In conclusion, cupping therapy is a significant treatment method that can be used among bodybuilders. Cupping therapy shows potential for relieving muscle fatigue without harming the muscle when compared to frequently utilized interventions (such as stretching, cooling, massage and many among others). Muscle soreness and stiffness can be reduced, local blood flow can be improved, and cupping therapy can help. All of these cupping therapy's therapeutic effects could aid in the recuperation of muscles that have been fatigued by exercise. Therefore, compared to other interventions, cupping therapy may be a better intervention for enhancing recovery from muscle fatigue. In a nutshell,

the findings of this study demonstrate that this study had positive results from the use of dry cupping to reduce delayed muscle soreness and improve shoulder joint flexibility.

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## Appendix 1: Ethical Committee Approval

Arab American University- Palestine  
Deanship of Scientific Research  
IRB committee  
Tel: 04-241-8888, ext 1196  
E-mail: [irb\\_aaup@aaup.edu](mailto:irb_aaup@aaup.edu)



الجامعة العربية الأمريكية - فلسطين  
عمادة البحث العلمي  
لجنة أخلاقيات البحث العلمي  
تلفون: 1196 ext 04-241-8888  
البريد الإلكتروني: [irb\\_aaup@aaup.edu](mailto:irb_aaup@aaup.edu)

### IRB Approval Letter

**Study Title:** The effect of dry cupping on delayed muscle soreness and flexibility of the shoulder joint among bodybuilders: a quasi-experimental study.

**Submitted by:** Ahmed Mohammad Kamel Eleyat

**Date received:** 17. Jan. 2023

**Date reviewed:** 15/02/2023

**Date approved:** 04/03/2023

Your Study titled "The effect of dry cupping on delayed muscle soreness and flexibility of the shoulder joint among bodybuilders: a quasi-experimental study." With archived number 2023 /A /35 /N was reviewed by the Arab American University IRB committee and was approved on 04/03/2023.

Reham Khalaf-Nazzal, MD, PhD  
IRB committee chairman  
Arab American University of Palestine



**General Conditions:**

1. Valid for 6 months from date of approval.
2. It is important to inform the committee with any modification of the approved study protocol.
3. The committee appreciates a copy of the research when accomplished.

لجنة أخلاقيات البحث العلمي في الجامعة العربية الأمريكية

IRB at Arab American University

## Appendix 2: Consent Form

*Arab American University*

*Scientific Research Deanship*

*Ethical Review Committee*



الجامعة العربية الأمريكية

عمادة البحث العلمي

لجنة اخلاقيات البحث العلمي

AAUP-IRB Code No.: .....

AAUP-IRB Date: .....

أنا ..... (اسم المشارك /

اختياري) أوافق بموجبه على المشاركة في البحث السريري (دراسة سريرية) المحددة أدناه:

تأثير الحجامة الجافة على وجع العضلات المتأخر ومرونة مفصل الكتف بين لاعبي كمال الأجسام الأصحاء: دراسة شبه تجريبية.

تم شرح طبيعة الدراسة وهدفها وتفسيرها عن طريق الباحث الأساسي أحمد محمد كامل عليات.

لقد تم إخباري عن طبيعة البحث من حيث المنهجية والآثار السلبية المحتملة والمضاعفات (حسب ورقة معلومات المشارك). بعد معرفة وفهم

جميع المزايا والعيوب المحتملة لهذا البحث ، أوافق طواعية بمحض إرادتي على المشاركة في البحث السريري المحدد أعلاه.

أفهم أنه يمكنني الانسحاب من هذا البحث في أي وقت دون إبداء أي سبب على الإطلاق.

التاريخ: ..... إمضاء المشارك: .....

في حضور:

اسم: .....

تعيين: ..... إمضاء: .....

(شاهد على توقيع المشارك)

أؤكد أنني أوضحت للمريض طبيعة وهدف البحث المذكور أعلاه.

تاريخ: ..... إمضاء: .....

(الباحث)
----------

### Appendix 3: Personal Information

- Demographic information:

➤ Patient's name and surname: .....

➤ Mobile number:

age:

height:

weight:

BMI:

➤ Occupation:

Degree:

➤ Habits:

smoking: YES NO

Alcohol: YES NO

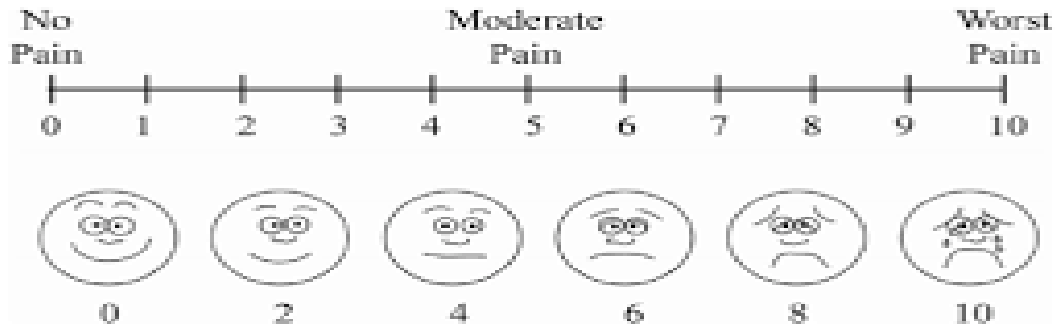
hormone: YES NO

Steroids: YES NO

➤ Medicines used:

➤ CV:

➤ Family history:



➤ Start Date: .....

End Date: .....

➤ Visual Analogue Scale:

➤ Pain pressure threshold measurement:

Muscle	Pre/Kg	Post/Kg
Upper trapezius		
Middle trapezius		
Lower Trapezius		
Medial Deltoid		
Posterior Deltoid		

➤ **Shoulder joint flexibility:**

<b>Measurement</b>	<b>Distance/ Pre</b>	<b>Distance/ Post</b>
Can clasp hands together = <b>very good flexibility</b>		
Fingertips almost touch = <b>good but need work</b>		
Not within an inch of touching fingertips together = <b>poor, needs a lot of work</b>		

## Appendix 4: Information sheet.

*Arab American University*

*Scientific Research Deanship*



الجامعة العربية الأمريكية

عمادة البحث العلمي

### نموذج المعلومات والتعريف حول البحث

اسم البحث: تأثير الحمامة الجافة على وجع العضلات المتأخر ومرونة مفصل الكتف بين لاعبي كمال الأجسام الأصحاء: دراسة شبه تجريبية.

اسم الباحث: أحمد محمد عليات

تحية طيبة وبعد

نقدر لكم ثقتكم للمشاركة بهذا البحث, الذي يعتبر جزء من دراسة الماجستير في العلاج الطبيعي في الجامعة العربية الأمريكية.

هذا البحث يهدف الى معرفة تأثير الحمامة الجافة على وجع العضلات المتأخر بعد التمرين ومرونة مفصل الكتف عند لاعبي كمال الأجسام الأصحاء.

معلومات عن دور العلاج الطبيعي:

عالج يتم من خلال التقليل من ألم العضلات المتأخر بعد التمرين , حيث تعمل الحجامة الجافة على تنشيط الدورة الدموية وتحرير اللفافة العضلية من الالتصاقات العضلية , وكذلك الامر في مرونة مفصل الكتف تعمل على زيادة المدى الحركي وتخفيف مستوى الألم.

لا يوجد أي اثار جانبية او خطر حول اجراء التدخل العلاجي.

المعالج الذي سوف يقوم بالعلاج ذو خبره وكفاءة , حيث سيقوم بالعلاج بشكل كامل وعلى أكمل وجه

في حال رغبت في الاستمرار في العلاج بالطريقة التي قام الباحث بشرحها لك , وتم اجابتك عن جميع الأسئلة التي

تريد معرفتها , الرجاء التوقيع على نموذج الموافقة المرفق وتسليمها إلى أخصائي العلاج الطبيعي.

إن انسحابك من الدراسة في أي وقت لن يؤثر او يعمل لك أي عقوبة.

إن مشاركتكم هي طوعيه بحيث نعتمد مشاركتكم من خلال التوقيع على نموذج الموافقة والذي من

خلاله يتم فهم هدف البحث , اذا رغبت في السؤال او معرفة المزيد من المعلومات ,من خلال

التواصل مع الباحث أحمد عليات (0569502087)

شاكرين لكم حسن تعاونكم

أحمد محمد كامل عليات

أخصائي علاج طبيعي

طالب ماجستير علاج طبيعي

الجامعة العربية الأمريكية

## الملخص

**المقدمة:** يعتبر تأخر ظهور الألم العضلي نتيجة حتمية للتمرين والنشاط البدني لدى الرياضيين، كما أنه من أهم المشاكل التي تواجه لاعبي كمال الأجسام، نتيجة التعرض للتوتر العضلي بعد ممارسة التمارين بأوزان عالية. الحجامة الجافة يمكن أن يكون لها تأثير مفيد على تأخر آلام العضلات ومفاصل الكتف.

**الهدف:** بحثت هذه الدراسة في تأثير الحجامة الجافة على تقليل آلام العضلات المتأخرة وتحسين مرونة مفصل الكتف لفهم كيفية ارتباطها بإنشاء نمط حياة صحي والحفاظ عليه ومنع الإصابات بين لاعبي كمال الأجسام.

**الطرق:** أجريت دراسة كمية/شبه تجريبية على 40 مشاركًا يتمتعون بلياقة بدنية وصحية (جميع الذكور؛ تتراوح أعمارهم بين 20-40 عامًا)، وأكملوا بروتوكول تمرين للحث على ألم العضلات المتأخر وانخفاض مرونة الكتف.

**التدخل:** تم إجراء جلسة علاج بالحجامة الجافة لمدة 7 دقائق ولمرة واحدة على كل مشارك على العضلات الدالية

والعضلة (UT، MT، LT)، بعد تحديد نقاط الزناد بعد أن خضعت كل مجموعة لفحص مسبق. (AD، MD PD) شبه المنحرفة

الاختبار القبلي والاختبار البعدي بعد 48-72 ساعة.

**مقاييس النتائج الأولية:** خضع كل مشارك لاختبار مسبق قمنا فيه بقياس وجع العضلات المتأخر باستخدام جهاز عتبة ضغط الألم، ونطاق حركة الكتف من خلال اختبار مرونة الكتف وقمنا بقياس شدة الألم من خلال مقياس تناظري بصري

(VAS).

**النتائج:** أظهرت النتائج أن الحجامة الجافة لها تأثير مفيد على تأخر آلام العضلات ومرونة مفصل الكتف

**الاستنتاج:** الحجامة الجافة قد تساعد في تقليل مستويات نقص الأوكسجة والهيموجلوبين وكذلك زيادة مستويات الهيموجلوبين. وهذا يعزز تناول الأوكسجين المحلي ويعزز دوران الأوعية الدقيقة في الدم ونشاط الدورة الدموية. وقد يكون لذلك علاقة بالتأثير الكبير للحجامة الرياضية على أداء لاعبي كمال الأجسام.