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Cupping therapy increases swim speed of competitive swimmers with symptomatic myofascial shoulder pain

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Data availability statement

The data that support the findings of this study are available from the corresponding author, S.S.J., upon reasonable request.

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Cupping therapy increases swim speed of competitive swimmers with symptomatic myofascial shoulder pain

Abstract

The researchers aim to determine the effects of MCT among swimmers with symptomatic shoulder myofascial pain. In this study, there were twenty-four (n=24) swimmers ages ranging from 14-55 years old who had experienced shoulder pain were assessed for the presence of MPS and were given a therapeutic intervention once a week for 4 weeks. Measurements include ROM, Numeric Pain Scale, swim speed test and a one-way ANOVA was used to calculate all the gathered data. There is a significant decrease in pain severity, improvement of ROM and decrease in swim speed among the both groups. However, the experimental group showed statically better results in pain and ROM. Although statistically insignificant, experimental group exhibit more decreased swim speed than the control group. Myofascial Cupping Therapy can be used as treatment for shoulder MPS and decrease in ROM. However, there is a need for further studies to validate its effects on swim speed.

Keywords: swim speed, pain severity, myofascial pain syndrome, myofascial cupping therapy, swimmers

Introduction and Rationale

Myofascial pain syndrome (MPS) is common among the general population who undergo constant physical activities. (Bron & Dommerholt, 2012; Jafri, 2014; S Parthasarathy, Siyam Sundar1, 2019)

The exact mechanism of MPS is still to be further studied due to its correlation with contraction-excitation, inputs in neuromuscular junctions, and cellular signaling integration; MPS consist of symptoms such as pain, decrease mobility and decline of well-being which is caused by the presence of taut band muscles that consist of foci with hypersensitivity named trigger points, these are activated as a result to the activation of

knots that are hypothesized to be the origin of pain and elicits upon palpation hence called "jump sign." (Bron & Dommerholt, 2012; Jafri, 2014; S Parthasarathy, Siyam Sundar1, 2019)

MPS is categorized into an acute type of pain that resolves after simple treatments and chronic with a duration that would last for 6 months or longer and have bad prognosis. (Tantanatip & Chang, 2019)

Overhead activities leads to repetitive stress thus sports and activities such as softball or baseball during a serve in a volleyball, javelin throwing and high repetitive exercises such as swimming causes pain in several areas of the body; breaststrokers were prone to develop knee pain while freestylers were prone to develop shoulder pain but it was found that all swimmers have a common prevalence of developing back pain; Exercises and medicine were utilized as conservative treatment in addressing myofascial pain however recent alternative treatment such as Myofascial Cupping was observed to also assist in improving athletic performance, muscle regeneration, and reduction of pain on musculoskeletal disorders of athletes. (Dwelly et al., 2009; Mydock, 2017; Wanivenhaus et al., 2012)

Several traditional Chinese medicines (TCMs) such as cupping therapy have been slowly incorporated into the physical therapy rehabilitation in pain management. Cupping therapy is classified into six(6) categories which composes of dry, flash, wet and massage cupping , altogether these categories were coined as technical types; it has been stated that the underlying principle of cupping's pain relief has been hypothesized to be due to the pain gate theory which stimulates the trigger area during the treatment of various disease; the counter irritation of pain provides instant relief thus leading to the athlete's frequent utilization of the treatment; due to this interest towards cupping therapy from the public and athletes are growing due to the media, adaptation of international athletes and

as well as its effects to improve performance and recovery. (Mydock, 2017; Qureshi et al., 2017)

Myofascial treatment or Cupping Therapy have been widely introduced as an alternative treatment for pain among swimmers in other countries. Studies reported its effects on pain management and faster muscle recovery.

Further research is needed to see the effects of cupping therapy in relation to pain reduction, range of motion and swimming speed among Filipino Swimmer athletes who utilize freestyle during swimming competitions. This study aims to further analyze its possible effects in sports performance.

Materials and Methods

Research Duration

The researcher conducted the entire study for four (4) weeks which was conducted from the (13th) day of January 2020 to the seventh (7th) of February 2020.

Research Design

The researcher used a true experimental design which comprises of experimental and control group. The experimental group was given Myofascial Cupping Therapy and the control group was given a period of stretching and rest only.

Research Respondents

The respondent included swimmers ranging from 14-55 years old who were presently diagnosed with Myofascial Pain Syndrome with decreased ROM.

Inclusion Criteria

The participants should acquire all of these components to participate in the study:

(1) At least 14-55 years old

(2) Either male or female swimmer athlete

(3) Current resident of the municipality of Cebu

(4) Has MPS symptoms that limit the shoulder only

Exclusion Criteria

The participants were excluded from participation if presenting any of the following conditions:

(1) Deep Vein Thrombosis

(2) Malignancy

(3) Radiculitis

(4) Radiculopathy

(5) Rheumatoid Arthritis on the shoulder

(6) Shoulder dislocation

(7) Frozen shoulder

(8) Any form of diabetes

Power Analysis and Sample Size Determination

This was a study of continuous response variables from independent control and experimental subjects with one (1) control(s) per experiment subject. The response of each group was distributed with a mean of (5.4) for the control group and a mean of (0.4) for the experimental group. (ALICABO, 2017) Both of the following have a corresponding standard deviation of (8.64) for the control group and (0.2) for the experimental group. This means that the researcher must obtain at least 24 participants for both the control and experimental groups to be able to reject the null hypothesis which would conclude that the population means of both experimental and control groups are equal with probability (power)0.9. The Type I error probability associated with this null hypothesis is 0.5.

Sampling Frame

The participants were gathered specifically from universities located within the city due to its access to the participants. The researcher utilized the Cebu City Sports Complex's Olympic pool. University Swimming Team coaches provided a list of possible swimmers. The researcher asked the participants to sign an informed consent form.

Sampling Design

Purposive sampling technique which selected 24 participants for both groups with at least 12 participants, was used. Myofascial Cupping Therapy was conducted to the experimental group while stretching and rest was given to the controlled group. The willing participants was given an informed consent form.

Site of the Study and Available Facilities

The study was conducted in the Municipality of Cebu City, specifically the Cebu City Sports Complex. The site had access to a swimming pool while benches and towels were provided for the participants during the study. The researcher performed the intervention with the provided input and guidance of a certified cupping therapist.

Materials and Equipment

The researcher utilized the Numeric Pain Rating Scale to assess the severity of the shoulder pain and goniometer to measure the participant's range of motion (ROM). The reference for the ROM values was from the American Academy of Orthopedic Surgeons (AAOS). The researcher used the silicone cups to create a negative pressure and baby oil as a medium to enable a suction effect. A hand-held timer (HHT) was used to record the swim speed.

Study Plan and Data Collection

The researcher created a transmittal letter containing the purpose of the study and why the research has been conducted. The letters were given to the specific university

swimming team coaches and the municipality mayor of Cebu City in order to secure a clearance upon performing the research. The respondents were then given a consent form that contained the purpose and how the research was to be implemented. The form also contains the benefits and possible risks that might occur upon the conduct of the study. Prior the intervention the participants were randomly assigned among the controlled and experimental group through a fishbowl method. The Numeric Pain Scale was used to assess pain, and Range of Motion were taken after signing of consent form

The schedule of availability of treatment were provided to the participants. During treatment, a towel was provided for draping and comfort. The participants were asked to sit down and cups were placed on the shoulders after the application of baby oil. The placement of the cup depends on the size of the muscle and severity of the trigger point. The muscles that were specifically cupped, were Upper Trapezius, Supraspinatus, Rhomboid minor, Rhomboid major, Teres Minor, Anterior Deltoid, Middle Deltoid, levator scapulae, infraspinatus and Latissimus Dorsi. The cups were then left on the participant's shoulder for 20 mins in order to degrade the formation of the adhesion. The researcher slid the cups along the orientation of the muscle from the muscle's origin to insertion in order to facilitate the targeted muscle. In order to gather the speed of the swimmers, a swim speed test that required the participants to perform a freestyle stroke in 50 meters was conducted. The speed per session was recorded to track the participant's progress.

Data Processing and Analysis

The Researcher used the Analysis of Variance to differentiate pre- and post- intervention mean values of participant's pain severity, ROM and swim speed. To control possible differences between mean values, Analysis of Covariance was utilized to distinguish the significance of the values that were obtained.

Work Plan Schedule

The researcher provided a transmittal letter approved by the research adviser and instructor. The letter was given to the Mayor of Cebu City and specific university swimming team coaches in order to secure a clearance for research implementation.

Ethical Considerations

This research project subscribes to the ethical principles of the conduct of research involving human subjects mandated by the Philippine Health Research Ethics Board and relevant national and international organizations. It was approved by the Southwestern University PHINMA Research Integrity Board on December 7,2019. Informed Consent Forms were provided, verbally explained, and signed by the respondents prior to the start of involvement in the study

Results and Discussion

Demographics of Respondents

Twenty-four (24) comprising of (12) female and male participants were included in the study. Both experimental and control groups consisted of at least six (6) females and six (6) males. The mean age was (18.3 5.1) years.

Pre-intervention and Post-intervention Pain Severity between Two Groups

The mean baseline NPS score of the control group was (7.5±0.8) while the mean baseline NPS score of the experimental group was (7.8±1.1). After four weeks of cupping therapy and stretching exercises, both groups also showed a significant difference: the control group with a mean NPS score of (3.6±3.4) and the experimental group with a mean NPS score of (0.8±1.2)

Based on the researcher's observation, the experimental group showed a significant decrease in pain intensity during the second week of undergoing cupping therapy. This supports claims that cupping therapy provides significant pain relief after

undergoing a single treatment session. (Chi et al., 2016) , the experimental group exhibited consistent improvement of pain intensity after undergoing four weeks of intervention.

ROM and Comparison between Two Groups

Prior to the treatment, control group has a mean baseline ROM of left shoulder flexion (169.3±39.7), right shoulder flexion (167.6±72.3), left shoulder extension (52.6±21.5), right shoulder extension (50.2±16.6), left shoulder abduction (171.3±23.9), right shoulder abduction (172.1±15.6), left shoulder internal rotation (62.3±67.7), right shoulder internal rotation (62.9±40.3), left shoulder external rotation (82.2±28.9), and right shoulder external rotation (89.6±16.8) while the experimental group has a mean baseline ROM of left shoulder flexion (166.2±18.7), right shoulder flexion (167.3±29.7), left shoulder extension (49.3±62.8), right shoulder extension (43.8±89.7), left shoulder abduction (165.8±108.2), right shoulder abduction (165.2±24), left shoulder internal rotation (57.9±34.2), right shoulder internal rotation (55.2±34.2), left shoulder external rotation (76.5±50.6), and right shoulder external rotation (75.5±43).

After four (4) weeks of treatment both groups showed a significant difference in ROM but the experimental group (cupping group) showed better effects than the control group based on the mean values.

Control group has a mean ROM of left shoulder flexion (169.8±34), right shoulder flexion (167.9±69.5), left shoulder extension (52.8±23.5), right shoulder extension (50.1±17.5), left shoulder abduction (170.8±23.7), right shoulder abduction (172.1±20), left shoulder internal rotation (62.8±67.7), right shoulder internal rotation (64.3±40.4), left shoulder external rotation (82.5±24.8), right shoulder external rotation (79.1±31.7) while the experimental group now has a mean ROM of left shoulder flexion (180.2±0.5), right shoulder flexion (180.1±0.4), left shoulder extension (60.8±1.1), right shoulder

extension (59.5±1.9), left shoulder abduction (179.8±1.8), right shoulder abduction (179.8±0.4), left shoulder internal rotation (70.7±2.2), right shoulder internal rotation (69.8±1.2), left shoulder external rotation (90.7±1.5), right shoulder external rotation (90.7±1.5).

The mean baseline NPS score of the control group was (7.5±0.8) while the mean baseline NPS score of the experimental group was (7.8±1.1). After four weeks of cupping therapy and aerobic exercises, both groups also showed a significant difference: the control group with a mean NPS score of (3.6±3.4) and the experimental group with a mean NPS score of (0.8±1.2)

According to the researcher's observation, the experimental group exhibited a significant increase in ROM and decrease in pain intensity during the second week of the intervention. This supports the claim that undergoing a single myofascial cupping therapy treatment would provide a significant result due to its positive effect on flexibility, pain threshold, and muscle contraction.

There has been a consistent improvement of ROM and pain intensity between the four weeks of intervention for the experimental group. Increasing the frequency of the intervention would provide better results in comparison to a single treatment session. (Fousekis et al., 2016) The result of the control group is still significant; however, the formulated results were not consistent since the baseline until post-intervention while the experimental group exhibited a consistency in increasing ROM and decreasing pain severity all throughout the treatment time.

Post-intervention Swim Speed Result between two groups

During the four weeks of intervention both the experimental group and the control group's swimming speed was monitored. The researcher wishes to compare whether an

intervention significantly affects variable "Swim Speed," compared against a Control Group (coded 1) and an Experimental Group (coded 2).

The data was analyzed using a mixed-design ANOVA with a within-subjects factor of time (Week 1, 2, 3, and 4), and a between-subject factor of group (control, experimental). Main effect of time is $F(1.71,37.73) = 9.41$, $p<0.01$, partial eta squared = 0.30. There is a significant difference of means between the four weeks. Main effect of the group is $F(1,22) = 0.93$, $p=0.35$, partial eta squared = 0.04. There is no significant difference between the groups. The two-way ANOVA conducted examined the effect of time and group on swim speed. There is a significant interaction between time and group, $F(1.71,37.73) = 6.13$, $p=0.01$, partial eta squared = 0.22. Simple main effects analysis showed that there are significant differences between weeks 1 ($M=33.53$, $SD=0.82$) and 4 ($M=30.95$, $SD=0.79$), weeks 2 ($M=33.82$, $SD=0.84$) and 3 ($M=31.98$, $SD=0.88$), weeks 2 and 4.

Based on the researcher's observation, there is a significant decrease of swim speed for both experimental and control groups. However, there is no significant difference in between both groups thus, there is no difference in improvement for swimming speed among those swimmers who underwent myofascial cupping therapy and stretching in comparison to those who only performed stretching exercises and a period of rest.

Both cupping therapy and passive stretching improves muscle activity. (Kim et al., 2011) Therefore, both interventions can contribute to the significant improvement of swimming speed. However, this is only applicable among swimmers who utilize the freestyle stroke, thus further research about other swimming techniques must be done to determine the difference of effects between the interventions.

Conclusion

Twenty-four (n=24) individuals had experienced shoulder pain and were assessed for

presence of Myofascial Pain Syndrome (MPS). Twelve (n=12) participants (age=18.25.1) served as the experimental group which received myofascial cupping therapy treatment and stretching exercises and the another twelve (n-12) participants (age=18.45.7) both interventions were statistically significant, however, the experimental group exhibited better significant results in decreasing the pain severity and increasing ROM in comparison to the calculated mean values, In terms of swim speed, there is significant improvement of swim speed in both groups. The researcher has found out that there is a greater decrease in swim speed for the experimental group. However, via statistical calculations the result showed that there were no significant differences between experimental and control groups.

Therefore, the combination of Myofascial Cupping Therapy and stretching exercises is more effective in reducing pain severity and increasing ROM in comparison to stretching exercises and rest.

Appendix:

Appendix A. List of participant's swim speed per week.

SWIM SPEED								
	Control Group				Experimental Group			
week	1	2	3	4	1	2	3	4
	30.06	28.8	26.4	25.4	35.4	35.2	34.2	33.8
	27.34	28.9	28.9	28.9	40.1	35.5	32.5	31.9
	30.56	32.6	32.6	30.6	39.2	35.9	31.2	30.2
	36.28	34.8	34.8	34.8	28.7	28.6	27.4	26.7
	35.1	34.6	34.6	33.6	28.1	27.7	26.1	25.9

	38.23	37.3	37.3	37.3	35.3	35.9	35.9	28.5
	38.23	37.3	37.3	37.3	35.3	35.9	35.9	28.5
	32.24	40.6	36.5	37.9	34.5	33.3	31.9	30.1
	35.52	39.5	39.5	37.6	36.4	35.5	32.5	28.5
	36.42	39.6	37.6	37.01	33.1	33.3	30.5	27.5
	32.13	38.9	33.3	30.4	28.3	30.3	28.4	23.7
	29.15	27.5	25.4	27.9	31.2	27.8	25.4	35.8
	30.15	32.5	32.5	32.45	41.2	37.5	36.4	29.1
Mean	32.8	34.6	33.8	32.8	34.3	33	31	29.1

Appendix B: Calculated Group time Swim Speed

Measure: SwimSpeed

Group	time	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Control	1	32.779	1.166	30.362	35.197
	2	34.608	1.185	32.149	37.066
	3	32.944	1.246	30.360	35.529
	4	32.823	1.123	30.494	35.153
Experimental	1	34.282	1.166	31.865	36.700
	2	33.037	1.185	30.578	35.495
	3	31.023	1.246	28.439	33.608
	4	29.070	1.123	26.741	31.399

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