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Athletic Trainers' Perceived and Actual Knowledge of Cupping Therapy Concepts

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Purpose: To date, there does not appear to be a study published that has examined the prevalence of clinical use and the perceived and actual knowledge of cupping therapy that clinicians possess. The purpose of this study was to determine the perceived and actual knowledge of cupping therapy among athletic trainers. **Methods:** 113 athletic trainers completed the study (age = 35 ± 10 years, certified experience = 12 ± 10 years). Participants were sent an electronic survey via email that assessed frequency of usage, perceived knowledge, and actual knowledge of cupping therapy. Measures of central tendency (means, standard deviations, frequencies) were calculated for all survey items. A Pearson correlation was calculated for the perceived knowledge and actual knowledge items to identify a knowledge gap between what one believes they know and actually what they do know. Finally, an independent samples t-test was used to explore differences on the actual knowledge assessment based on prior education. Significance was set at $P < .05$ a priori. **Results:** The majority of certified athletic trainers reported not viewing the use of cupping therapy as necessary to their clinical practice. However, the majority also reported using cupping therapy at least once in the past week when treating patients. Regarding perceived knowledge, the majority of respondents were in the mid-range of agreement/disagreement, indicating at least some level of uncertainty. Average scores on actual knowledge were 8.90±1.34 out of 12 questions. A poor positive relationship was found between perceived and actual knowledge ($r = 0.125$, $P = 0.259$). We also identified a poor positive relationship ($r = 0.079$, $P = 0.439$) between the actual knowledge assessment score and the likelihood to pursue continuing education item from the perceived knowledge assessment. **Conclusions:** While the majority of athletic trainers did not view cupping therapy as necessary to their clinical practice, the majority did use the tool in their weekly practice. The relationship between actual knowledge and pursuit of continuing education suggestion that continuing education may improve knowledge of cupping therapy. **Keywords:** *Cupping therapy, Myofascial decompression, Perceived knowledge, Actual knowledge, Knowledge gap*

INTRODUCTION

Cupping therapy is an ancient modality that has been documented as early as 3300 BC.¹ Through various means of suction, cupping therapy is employed by clinicians around the world with the goal of improving blood flow, decreasing pain, and increasing function.^{2,3} Since the turn of the century, cupping therapy has grown in

popularity in the United States and other countries where Western Medicine is the primary source of healthcare.¹ A large amount of this popularity can be attributed to increased media interest resulting from elite level athletes receiving cupping therapy.^{4,5} Even though cupping therapy has gained popularity as a treatment device in the United States,

there is still no consensus on the ideal parameters for applying a cupping therapy treatment to either amateur or professional athletes.¹ This lack of consensus can be attributed at least in part to a lack of high quality studies and a lack of standardized methodology.^{3,6} Another potential factor may be the stigma of Eastern Medicine practices in countries that practice primarily Western Medicine.⁶

There are a number of theories regarding how cupping therapy achieves its therapeutic effects. Cupping therapy has been shown to have a positive effect on local and regional blood flow.^{2,7} During a cupping therapy treatment, the local tissues undergo negative pressure that results in compression of the tissues in contact with the rim of the cup and distraction of the tissues within the cup. The amount of compression and distractions that occurs is determined by the amount of suction exerted by the cup. This lower pressure within the cup is thought to cause a pressure differential between the skin within the cup and underlying capillaries.⁸ When exposed to this pressure differential, blood vessels undergo vasodilation, which causes localized increased blood flow at the treatment site.⁸ This increase in blood flow may result in pain reduction demonstrated in previous studies.⁹ Aside from increasing blood flow, cupping therapy may reduce pain through other mechanisms. Lowe reported that while the body is healing from the circular marks left by cupping therapy treatment, macrophages are attracted to the site of treatment and the enzyme heme oxygenase-1 (HO-1) is produced.⁸ As HO-1 is broken down, the bi-products include: heme, biliverdin, bilirubin, carbon monoxide, and iron.⁸ During this process, the iron bi-product is sequestered by

ferritin and the other bi-products have direct and indirect anti-oxidant, anti-inflammatory, and neuromodulatory effects that may create a better environment for healing at the treatment site.⁸ Another theory that has been put forth is that cupping therapy decrease pain through the principle of counter-irritation.¹⁰ This idea suggests that cupping therapy stimulates various sensory nerves in order to inhibit the sensation of pain within pathological tissues.

Within athletic training, cupping therapy has grown in popularity in recent years. Researchers have even begun examining the uses for cupping therapy within athletic populations.¹ In spite of the trend, there does not appear to be a study published that has examined the prevalence of clinical use and the perceived and actual knowledge of cupping therapy that clinicians possess. Such information would have potential value for athletic training educators attempting to prepare lessons or continuing education opportunities regarding cupping therapy. The purpose of this study was to determine the perceived and actual knowledge of cupping therapy among athletic trainers.

METHODS

Design

This study followed a cross-sectional design utilizing an internet based survey for data collection.

Participants

Participants were recruited for this study by requesting the email contact information for a random sampling of 1,000 athletic trainers through the National Athletic Trainers' Association (NATA) research survey database that

were actively employed in any setting. A total of 144 athletic trainers opened the survey link (access rate = 14.4%) with 129 completing a portion of the instrument (response rate = 12.9%). Ultimately, 113 participants (age = 35 ± 10 years, years of certified experience = 12 ± 10 years) completed the survey and were included in the statistical analysis (completion rate

= 78.5%). Demographic information regarding the participants is presented in Table 1. Participants were informed of the survey's purpose as part of the beginning of the survey, at which point informed consent was obtained per the protocol approved by the University of Texas at Tyler Institutional Review Board.

Demographic Factor	Criteria	Responses
Sex	Male	55, 48.7%
	Female	56, 49.6%
	Missing Responses	2, 1.8%
Clinical Practice Setting	College/University	102, 90.3%
	Secondary School	5, 4.4%
	Emerging Settings	3, 2.7%
	Clinic and Hospital	1, 0.9%
	Professional Sports	1, 0.9%
	Missing Responses	1, 0.9%
Highest Degree Earned	Professional Bachelor's	13, 11.5%
	Professional Master's	55, 48.7%
	Post-professional Master's (in Athletic Training)	16, 14.2%
	Post-professional Master's (not in Athletic Training)	26, 23.0%
	Post-professional Clinical Doctorate	3, 2.7%

Table 1. Totals and percentage for participant demographic information

Procedures

An e-mail message was sent to all prospective participants inviting them to participate in a survey via a hyperlink from a web-based server (Qualtrics Inc., Provo, UT) from January to February 2019. The inviting message contained information about the investigators, the purpose of the study, the nature of the survey, and pertinent IRB information. Four follow-up emails were sent following

the initial distribution weekly prior to the survey being closed for statistical analysis.

Instrument

Prior to study recruitment, the authors completed a pilot study of 23 post-professional athletic training students from a Midwestern university in August 2018. The pilot study assisted with content and face validation of the tool. No major changes were made to the

instrument following the pilot study and all pilot study participants were excluded from the final data collection.

Following the informed consent and demographics section, the instrument contained items related to formal education and training regarding cupping therapy, as well as the frequency of usage for cupping therapy during clinical practice. Participants were also asked to provide information regarding the materials they used when delivering cupping therapy.

The perceived knowledge items were adopted and adapted from the Flynn and Goldsmith tool for perceived knowledge. Additionally, five items were added related to the participant's competency with prescribing and applying cupping therapy treatments. Participants were given statements to read and then asked to choose from "strongly agree" (1), "agree" (2), "somewhat agree" (3), "neither agree nor disagree" (4), "somewhat disagree" (5), "disagree" (6), "strongly disagree" (7).

For the development of the questions regarding actual knowledge of cupping therapy, a recent review of literature was performed to inform the content.^{2,3,8} This content was designed to be similar to questions given to professional athletic training students in a therapeutic modalities course. These questions were developed by an investigator with recent content expertise and experience creating survey based research. Prior to requesting email addresses of potential participants,

24 certified athletic trainers taking part in graduate studies took the survey to ensure that the investigators would be able to test for the intended information regarding perceived and actual knowledge of cupping therapy. The actual knowledge assessment had a max total correct score of 12.

Ultimately, the survey consisted of 28 questions. These questions included: one question regarding consent to participate in the study, three multiple choice and two fill in the blank questions regarding demographic information, six multiple choice and two multiple answer questions regarding education and current usage of cupping therapy, 10 Likert-scale items that evaluated participants' perceived knowledge, and 10 multiple choice and two multiple answer questions that evaluated participants' actual knowledge.

Statistical Analysis

Data were downloaded and analyzed using a commercially-available statistics package (SPSS Version 25, IBM, Armonk, NY). Of the 1,000 athletic trainers who received the invitation to participate in the survey, the 113 completed responses were included in the data analysis. A completed response may have had missing data (item non-responder selection) yet completed the survey by finishing the last question. Missing data points are described in the data. Measures of central tendency (means, standard deviations, frequencies) were calculated for all survey items. We reverse scored four items of the perceived knowledge questionnaire and calculated a

mean score for the 10 items. Additionally, we calculated a total correct score per participant on the actual knowledge assessment. A Pearson correlation was calculated for the perceived knowledge and actual knowledge items to identify a knowledge gap between what one believes they know and actually what they do know. Finally, an independent samples t-test was used to explore differences on the actual knowledge assessment based on prior education. Significance was set at $P < .05$ a priori.

RESULTS

Education

The participants reported an almost even distribution with 51.3% ($n = 58$) stated they had not, while 48.7% ($n=55$) reported to have prior training or education on cupping therapy. For those that had received prior training or education, the participants were asked to identify which format the knowledge was delivered. The most common forms included: other clinicians or peer-to-peer teaching of the skill ($n = 37, 67.3\%$), continuing education course through a company or organization ($n = 24, 43.6\%$), and personal experiences (reading articles, searching the internet) ($n = 20, 36.4\%$). By way of contrast, the least likely form of knowledge delivery included: formal coursework (therapeutic modalities or intervention courses) in a professional program ($n = 3, 5.5\%$) or formal coursework (therapeutic modalities or intervention courses) in a post-professional program ($n = 3, 5.5\%$).

Clinical Applicability

Again, the participants were almost even split when asked if cupping therapy skills were necessary in their current job with

over half ($n = 58, 51.3\%$) reporting they were not necessary while 46.9% ($n = 53$) reported they were necessary. The participants were asked to identify what supplies they commonly utilized when completing cupping therapy. The vast majority of participants used plastic cups ($n = 82/94, 87.2\%$) as compared to silicone ($n = 26/94, 27.7\%$) or glass ($n = 11/94, 11.7\%$) cups. Most participants reported using massage lotion ($n = 57/94, 71.3\%$) for their cupping medium.

Most participants either reported to have completed cupping therapy on a patient within the last week ($n = 40, 35.4\%$) or never ($n = 25, 22.1\%$) in clinical practice. Moreover, the participants stated they either seldom (1-3 patient encounters; $n = 44, 38.9\%$) or occasionally (4-6 patient encounters; $n = 28, 24.8\%$) in a typical week for patient care. Interestingly, 27.4% ($n=31$) reported to not use cupping therapy at all in a typical week.

Perceived Knowledge

The participants had a mean sum of the perceived knowledge items ($n=10$) of 4.52 ± 1.29 out of 10 (minimum=1.20, maximum=6.90) indicating that most participants were in the mid-range of frequency count of correct responses are provided in Table 3.

Knowledge Gap

We identified a poor positive relationship between perceived knowledge mean scores and actual knowledge assessment total correct sum scores ($r = 0.125, P = 0.259$). Follow-up independent samples t-test performed related to previous cupping education identified knowledge score= 8.96 ± 1.23) formal or informal education on the intervention.

Item	Most Common Response
I am comfortable with the different types of cupping therapy and what I can and cannot do as an athletic trainer according to my state practice act.	Agree (n=34)
I do not feel very knowledgeable about the different techniques of cupping therapy including dry, wet, moving, flash, herbal, and water cupping.	Somewhat Agree (n=34)
Around my colleagues, I would be considered an "expert" on cupping therapy.	Neither Agree nor Disagree (n=28) and Disagree (n=28)
Compared to most other athletic trainers, I know very little about cupping therapy.	Neither Agree nor Disagree (n=33)
I am able to explain the proposed mechanism of action for cupping therapy	Agree (n=43)
I understand what injuries are indicated and contraindicated, as well as when in the healing process it is appropriate for cupping therapy as an intervention.	Agree (n=47)
I am unsure of how to perform function and safety inspections of cupping therapy equipment.	Disagree (n=39)
I am skilled and proficient in the application of cupping therapy.	Agree (n=32)
I am likely to pursue continuing education to improve my knowledge and skills about cupping therapy.	Agree (n=38)

Table 2. Perceived Knowledge assessment most common response

We also did not identify any significant differences ($P = 0.160$) between those who felt cupping skills were necessary ($n=51$, mean actual knowledge score= 8.96 ± 1.23) formal or informal education on the intervention. We also did not identify any significant differences ($P = 0.160$) between those who felt cupping skills were necessary ($n=51$, mean actual knowledge score= 9.12 ± 1.18) and those who disagreed that they were not necessary ($n=47$, mean actual knowledge score= 8.73 ± 1.45) for their job. Finally, we also identified a poor positive relationship ($r = 0.079$, $P = 0.439$) between the actual knowledge assessment score and the likelihood to pursue continuing education item from the perceived knowledge assessment.

DISCUSSION

The primary purpose of this study was to determine the perceived and actual knowledge of cupping therapy among athletic trainers. A secondary purpose was to determine the frequency of usage of cupping therapy among athletic trainers.

Our findings indicate that over half of the athletic trainers surveyed ($n = 58$, 51.3%) do not view cupping therapy as necessary to their clinical practice. However, the majority of athletic trainers surveyed utilize cupping therapy in their clinical practice, with only 22.1% ($n=25$) reporting never using cupping therapy.

Item	Frequency count of correct responses (%)
Which of the following images is of water cupping?	109 (96.5)
Which of the following images is of wet cupping?	100 (88.5)
Which of the following images is of fire cupping?	112 (99.1)
Which of the following images is of dry cupping?	109 (96.5)
Which of the following are true about cupping therapy? (Select all that apply)	11 (9.7)
Which of the following injuries/conditions are indications for cupping therapy? (Select all that apply)	38 (33.6)
You are scheduled to provide treatments for a patient with that is recovering from a hamstring strain. In the medical documentation, a clinician on the care team for the patient states in the previous daily note they are scheduled for cupping therapy. Which of the following would be the most appropriate intervention time for this patient?	101 (89.4)
A patient under your care states that they heard that cupping therapy is only effective if you bruise after the treatment. Is this an accurate statement about cupping therapy?	102 (90.3)
A secondary school patient reports to you with complaints of acute pain around his patellar tendon following the onset of workouts during the track and field season. As the athletic trainer for this patient, what option is most accurate in terms of proceeding with cupping therapy?	76 (67.3)
When treating a patient with plastic cups for the first time, how many pumps should be used to draw air from the cup when using a pneumatic/vacuum pump?	59 (52.2)
A patient complains of discomfort around the plastic cup placed on his lower back. What advice or adjustment during the treatment should you provide to improve their comfort?	75 (66.4)
After providing cupping therapy on the hamstring muscle group for mild muscular pain and tightness, what physical activity or follow-up intervention suggestions would you provide?	75 (66.4)

Table 3. Actual knowledge assessment questions and frequency of correct responses

Therefore, while cupping therapy is not considered necessary for clinical practice, this sample of athletic trainers are reporting using this modality thus demonstrating an increased interest in cupping therapy (n=88, 77.9%).

While cupping therapy has grown increasingly popular in recent years, athletic trainers appear to be split with regard to their perceived knowledge of the modality.^{4,5} Furthermore, the average score for actual knowledge revealed less than 75% accuracy (correct=8.90±1.34 out of 12 questions. Of particular concern was the low accuracy regarding true statements about cupping therapy (correct=11, 9.7%) and selecting appropriate injuries for which to prescribe cupping therapy (correct=38, 33.6%). This information suggests that not only are many athletic trainers unsure about knowledge related to cupping therapy, they may also be using cupping therapy on conditions that may benefit more from other treatment. Assuming that these athletic trainers are being exposed to knowledge of cupping therapy, this may indicate a case of knowledge and skill deterioration.

Previously literature has indicated that clinical skills are subject to deterioration if they are not practice over time.¹¹ In fact, some studies have suggested that skills such as cardiopulmonary resuscitation can decrease significantly in as little as 6 months.¹¹ While cupping therapy is likely to be utilized more often than cardiopulmonary resuscitation, there is still the potential for knowledge and skill deterioration if the modality is not used regularly. In the absence of clinical practice, continuing education has been shown to be

useful when employed to impart or retain knowledge.¹²

These may suggest a need for need to include information on theory and concepts related to cupping therapy with athletic training curriculums. In the event that this proves difficult, continuing education interventions should be created for the purpose of imparting or refreshing knowledge of the definition, modes of action, indications, and contraindications of cupping therapy. When said interventions are created, they should undergo evaluation and re-evaluation by attendees in order to ensure that they are effective and efficient at improving knowledge of cupping therapy among athletic trainers.

LIMITATIONS

One limitation of this study was the low response and completion rate for the survey. This is a similar limitation that other survey based studies on athletic trainers have encountered, and may affect the generalizability of the results when looking to analyze across the profession.¹¹ However, the results were typical of a 10% access rate and above a 50% response rate, with even distributions across sex, job settings, and previous education related to cupping therapy.

FUTURE RESEARCH

There is a need for additional research on the perceived and actual knowledge of cupping therapy and therapeutic modalities in general among athletic trainers. To the authors' knowledge, this is only the second study to examine perceived and actual knowledge of a therapeutic modality commonly used in athletic training.¹³ Future research should be

directed towards further assessing perceived and actual knowledge, as well as knowledge deterioration as related to cupping therapy and other therapeutic modalities.

CONCLUSION

In conclusion, cupping therapy appears to be an increasingly popular therapeutic modality in the athletic training setting. However, the participants in this study appeared to be split regarding their assessment of their perceived knowledge of cupping therapy. Furthermore, the participants correctly answered less than 75% of the questions assessing actual knowledge. Given that seeking out continuing education on cupping therapy seemed to have a positive effect on actual knowledge, clinicians may benefit from creation of continuing education interventions that are created to improve knowledge of the definition, modes of action, indications, and contraindications of cupping therapy.

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