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Effect of Cupping Therapy on Skin Surface Temperature in Healthy Individuals

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Purpose: The purpose of this study was to examine the effect of cupping therapy on skin surface temperature, at the medial forearm. **Methods:** 32 healthy subjects [13 females (age = 21.14 ± 1.70, height = 168.00 ± 9.70 cm, mass = 67.07 ± 16.93) and 16 males (age = 21.78 ± 1.90, height = 180.62 ± 6.09, mass = 88.35 ± 14.66) participated in this study. A mark was made with a permanent marker 7 cm distal to the medial forearm. Cupping therapy was performed over this mark with the use of a plastic pump cup for 15 minutes. Every 5 minutes the cup was removed in order for skin surface temperature to be taken. Skin surface temperature was taken with the use of an infrared thermometer at base line, 5 minutes into treatment, 10 minutes into treatment, 15 minutes into treatment, and 5 minutes after treatment. A one way repeated measures ANOVA was performed to analyze the difference in skin surface temperature over time. Significance was set at an alpha level $p < 0.05$. **Results:** Significant differences were found between all conditions (baseline = 89.37 ± 2.09, 5 minutes into treatment = 90.49 ± 2.08, 10 minutes into treatment = 91.65 ± 2.18, 15 minutes into treatment = 91.62 ± 2.26, 5 minutes after treatment = 92.40 ± 2.03, $p < 0.001$). **Conclusion:** A single cupping therapy treatment appears to significantly increase skin surface temperature at the treatment site. Increases in skin surface temperature have been suggested as a representation of increases in skin surface temperature. These findings suggest that a single cupping therapy treatment may increase skin surface temperature at the medial forearm. ***Keywords:*** *Cupping therapy, Myofascial Decompression, Skin surface temperature*

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 regional blood flow.[2] Cupping therapy has been documented as relieving pain in patients suffering from low back, shoulder, and neck pain.[3,7] 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.[8] 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.[9] When exposed to this pressure differential, blood vessels undergo vasodilation, which causes localized increased blood flow at the treatment site.[9] This increase in blood flow

may result in pain reduction demonstrated in previous studies.[10] 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.[9] As HO-1 is broken down, the bi-products include: heme, biliverdin, bilirubin, carbon monoxide, and iron.[9] 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 neuromodulary effects that may create a better environment for healing at the treatment site.[9] Another theory that has been put forth is that cupping therapy decrease pain through the principle of counter-irritation.[11] This idea suggests that cupping therapy stimulates various sensory nerves in order to inhibit the sensation of pain within pathological tissues.

In spite of research indicating that cupping therapy improves regional blood flow, to the authors' knowledge there have not been many to date that has examined localized blood flow.[10,12,13] Thus, the purpose of this study was to examine the effect of cupping therapy of localized blood flow in the forearm as represented by increases in skin surface temperature.

METHODS

Participants

32 healthy subjects [16 females (age = 21.14 ± 1.70, height = 168.00 ± 9.70 cm, mass = 67.07 ± 16.93) and 16 males (age = 21.78 ± 1.90, height = 180.62 ± 6.09, mass = 88.35 ± 14.66) participated in this study. Subjects were recruited based off of convenience sampling, chosen to reflect a healthy college aged population. Subjects did not have a history of cardiovascular disease or injury, and had not sustained a significant forearm injury within the previous 6 months. Subjects for this study were provided with information about this study and gave consent prior to data collection.

Cupping Therapy

Prior to the application of cupping therapy, participants were asked to identify their non-dominant arm. A mark was made with a permanent marker 7-cm off of the medial epicondyle of the non-dominant arm similar to the protocol used by Arce-Esquivel in his study of the effects of cupping therapy on regional blood flow.[2] After baseline temperatures were taken, coconut oil was then applied to the participant's forearm around the mark place. Coconut oil was chosen as the medium for skin preparation due to the relatively low risk of allergic reaction, and its availability within the clinic in which the research was being conducted. A plastic cup (Khangzhu Vacuum Cup, Beijing Kangda World Medical Appliance Center, Beijing, China), was then attached to a pump before being placed on the patient's forearm with the mark in the center of the cup. 2 pumps of air were then removed from the cup, and the pump was removed. The number of pumps was chosen based off of clinical techniques and previously conducted studies.[2] Treatment time was 15-minutes in total, with the cup being removed every 5 minutes in order for skin surface temperature to be taken. After temperatures were taken, the cup was replaced on the forearm in the same fashion as it was originally placed. Following the completion of treatment, the cup was removed for a final time and the forearm was cleaned with a terry cloth towel. No participants reported any adverse effects from the cupping therapy treatment.

Skin Surface Temperature

Infrared thermometry has been established as a valid method of measuring skin surface temperature as compared to indwelling thermistor probes and tympanic thermometry.[14] Prior to taking skin surface temperature, the investigator collecting data checked the thermostat in the room to ensure that the temperature was between 70 and 75 degrees Fahrenheit. Skin surface temperature

was taken at over the mark placed on the medial forearm using an infrared thermometer. Temperature was taken at baseline, 5 minutes into treatment, 10 minutes into treatment, 15 minutes into treatment and 5 minutes after treatment. At each time stamp, temperature was taken 3 times so that an average could be obtained.

Statistical Analysis

A one-way repeated measures analysis of variance was used to analyze the difference between skin surface temperature at the forearm at baseline, 5 minutes into cupping therapy treatment, 10 minutes into treatment, 15 minutes into treatment and 5 minutes after treatment. Significance was set at an alpha level of $p < 0.05$. Statistical procedures were performed using SPSS V25 (IBM, Armonk, NY).

RESULTS

Means and standard deviations for skin surface temperature in degrees Fahrenheit is presented in table 1. At each time stamp, temperature had increased at a statistically significant rate (baseline = 89.37 ± 2.09, 5 minutes into treatment = 90.49 ± 2.08, 10 minutes into treatment = 91.65 ± 2.18, 15 minutes into treatment = 91.62 ± 2.26, 5 minutes after treatment = 92.40 ± 2.03, $p < 0.001$). Temperature readings indicate that skin surface temperature increased significant throughout and immediately after a single cupping therapy treatment.

Skin Surface Temperature	
Time	**Temperature**
Baseline	**89.37±2.09***
Five Minutes into Treatment	**90.49±2.08***
Ten Minutes into Treatment	**91.56±2.18***
Fifteen Minutes into Treatment	**91.62±2.26***
Five minutes after Treatment	**92.50±2.03***

Table 1. Mean±SD scores for temperature in degrees Fahrenheit.

**Temperature was significantly different from previous condition*

DISCUSSION

The purpose of this study was to determine if cupping therapy would increase skin surface temperature. Skin surface temperature has been used as a means of determining differences in localized blood flow in previous studies.[15] While previous studies have shown that cupping therapy has increased localized blood flow, these studies have been conducted on body parts near the torso and may therefore have been affected by the warmer blood present. Results from the current study indicate that a 15 minute cupping therapy treatment does increase local skin surface temperature at the medial forearm. This increase in skin surface temperature suggests an increase in localized blood flow.

The exact mechanisms for cupping therapy increasing blood flow are not entirely understood. It has been suggested that the negative pressure created within the cup has an effect on the underlying capillaries leading to the increase in blood flow.[9] However, there do not appear to be any published studies examining the effects of cupping therapy may have on the physiological mechanisms of increased blood flow.

Increases in blood flow are theorized to be one of the mechanisms by which cupping therapy decreases pain.[10] Although the current study did not directly measure blood flow, the use of skin surface temperature as an analog has been reported in previously published literature.[2, 11, 12] While statistical analysis suggested that there was an increase in blood flow, it has yet to be determined how much of an increase in blood flow is necessary to achieve the desired therapeutic benefits of cupping therapy.

The findings of the current study suggest that there is a significant increase in skin surface temperature at the medial forearm after a single cupping therapy treatment. In this study, skin surface temperature was used as a representation of increased local blood flow. These results may support previous findings

that indicate that cupping therapy increases blood flow at a regional and local level.[2, 12]

LIMITATIONS

The current study only assessed skin surface temperature, and did not record direct measures of local blood flow. Skin surface temperature has been suggested to represent local blood flow, but may not provide a direct indication of the amount of blood flow increase that is occurring.

Another limitation is the sample size selected. Since the sampling was a convenience sampling, the sample size may not have been large enough to completely answer the research question. Variability of the results collected may have produced a larger standard deviation. Future studies should use random sampling and recruit a larger sample to ensure that statistical power has been achieved.

FUTURE RESEARCH

There is a need for future research to examine the amount of increased blood flow necessary to achieve therapeutic effects with cupping therapy. Future research should also seek to examine the potential of physiologic mechanisms behind this increase. This may provide information as to whether or not the increases in blood flow are only due to pressure changes within the cup.

CONCLUSIONS

In conclusion, a single 15 minute cupping therapy treatment has the potential to increase skin surface temperature at the medial forearm. These findings suggest that cupping therapy can increase localized blood flow. The results from this study may assist athletic trainers in determining situations in which cupping therapy may be an appropriate treatment option. Although previous research has demonstrated that cupping therapy can improve both local and regional blood flow, this study suggests that cupping therapy may improve local blood flow in the extremities rather than only near the torso.

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