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# The Effect of Wet Cupping on Baroreceptor Sensitivity in Hypertensive Patients in Sidenreng Rappang Regency, South Sulawesi

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| **Abstract:** | Wet cupping therapy removes toxins thereby increasing blood flow and stimulating baroreceptors sensitivity which provides a stimulus to the autonomic nerves. This stimulus reduces the sympathetic nerves' work and inhibits the vasomotor center, leading to vasodilation, therefore decreasing blood pressure and pulse frequency. This research aims to determine the effect of wet cupping therapy on baroreceptors sensitivity with blood pressure and pulse frequency indicators. It was conducted in Sidenreng Rappang Regency, South Sulawesi, eastern Indonesia from February to May 2021. Randomized Controlled Trial (RCT) method was used including two groups of 31 respondents each. The intervention group used wet cupping therapy to regulate anti-hypertensive drugs and the control group used anti-hypertensive drugs with blood pressure and pulse frequency measurements until 6 weeks after the therapy. Wet cupping affects baroreceptor sensitivity by reducing the indicators. The result showed a significant difference in blood pressure measurement (systolic; diastolic) before and after the 2-week follow-up period (P = 0.000; P = 0.001), and between 2 and 4 weeks (P = 0.000; P = 0.000), but between 4 and 6 weeks there was no significant difference in the intervention group (P = 0.248; P = 0.583). There was a significant difference in pulse frequency at 2 and 4 weeks after the intervention (P = 0.016). In conclusion, wet cupping therapy effectively increases baroreceptor sensitivity by reducing blood pressure and pulse frequency indicators in hypertensive patients up to 4 weeks limit after the therapy, without any serious side effects experienced by respondents. |

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July 6, 2021
To:
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Editora Jefe
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I am Mr. Fadli representing all authors in this manuscript. I would like to submit our manuscript titled "The Effect of Wet Cupping on Baroreceptor Sensitivity in Hypertensive Patients in Sidenreng Rappang Regency, South Sulawesi". This research aims to determine the effect of wet cupping therapy on baroreceptors sensitivity with blood pressure and pulse frequency indicators. None of the cupping theories addresses the issue of increased baroreceptor sensitivity. Therefore, this study aimed to determine the effect of wet cupping therapy on increasing baroreceptor sensitivity in hypertensive patients. This is different from previous research because it focuses on determining the sensitivity of the baroreceptor functioning as a regulating system for blood pressure and pulse frequency using the taibah theory approach. Therefore, these results are very useful for medical personnel in providing interventions related to the handling and prevention of increased blood pressure in hypertensive patients with wet cupping therapy which has an effect up to 4th week and provides a stimulus to increase baroreceptors in the carotid sinuses.

This article is not currently under consideration in another journal and it was/not submitted to another journal. It has/not been presented in a congress. This article can greatly contribute to the Journal of Enfermería Clínica because it is in accordance with the scope of the journal of **nursing** and **public health**. The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Thank you for your consideration

Sincerely yours,

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# Specimen of Title Page

## The Effect of Wet Cupping on Baroreceptor Sensitivity in Hypertensive Patients in Sidenreng Rappang Regency, South Sulawesi

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**For Review**

- This research aims to determine the effect of wet cupping therapy on baroreceptors sensitivity with blood pressure and pulse frequency indicators.
- Based on the cupping theory None of these theories has addressed the issue of increasing baroreceptor sensitivity. Therefore, the novelty of this study was to determine the effect of wet cupping therapy on increasing baroreceptor sensitivity in hypertensive patients.
- Wet cupping therapy is effective in increasing baroreceptor sensitivity which reduces blood pressure and pulse rate in hypertensive patients up to a limit of 4 weeks, without serious side effects.
- Therefore, it deserves to be recommended as a preventive therapy for hypertension. Future studies need to pay attention to the number of blood clots per cupping cup and not to use antihypertensive drugs at the same time. The development of research on Mean Arterial Pressure (MAP) measurement is also recommended.

# The Effect of Wet Cupping on Baroreceptor Sensitivity in Hypertensive Patients in Sidenreng Rappang Regency, South Sulawesi


## ABSTRACT

Wet cupping therapy removes toxins thereby increasing blood flow and stimulating baroreceptors sensitivity which provides a stimulus to the autonomic nerves. This stimulus reduces the sympathetic nerves' work and inhibits the vasomotor center, leading to vasodilation, therefore decreasing blood pressure and pulse frequency. This research aims to determine the effect of wet cupping therapy on baroreceptors sensitivity with blood pressure and pulse frequency indicators. It was conducted in Sidenreng Rappang Regency, South Sulawesi, eastern Indonesia from February to May 2021. Randomized Controlled Trial (RCT) method was used including two groups of 31 respondents each. The intervention group used wet cupping therapy to regulate anti-hypertensive drugs and the control group used anti-hypertensive drugs with blood pressure and pulse frequency measurements until 6 weeks after the therapy. Wet cupping affects baroreceptor sensitivity by reducing the indicators. The result showed a significant difference in blood pressure measurement (systolic; diastolic) before and after the 2-week follow-up period (P = 0.000; P = 0.001), and between 2 and 4 weeks (P = 0.000; P = 0.000), but between 4 and 6 weeks there was no significant difference in the intervention group (P = 0.248; P = 0.583). There was a significant difference in pulse frequency at 2 and 4 weeks after the intervention (P = 0.016). In conclusion, wet cupping therapy effectively increases baroreceptor sensitivity by reducing blood pressure and pulse frequency indicators in hypertensive patients up to 4 weeks limit after the therapy, without any serious side effects experienced by respondents.


Keywords: Wet cupping, Baroreceptors, Hypertension and Blood pressure.

## INTRODUCTION

Hypertension increases the prevalence of cardiovascular diseases.[1] Indonesia is one of the countries containing the most hypertensive patients with a prevalence of 24.4% in 2008, 25.8% in 2013 and increasing in 2018 by 34.1%.[2,3] Therefore, it is potentially higher than the available data. Patients with hypertension can attenuate baroreceptor stimuli, an autoregulatory system regulating heart rate and blood pressure located in the carotid sinuses of the aorta which stimulates efferent autonomic nerve activity to the heart and other blood vessels.[4,5]

Increased baroreceptor sensitivity increases sympathetic and parasympathetic activity resulting in a decrease in heart rate and blood pressure, and vice versa, decreased baroreceptor sensitivity will cause an increase in blood pressure.[6] Furthermore baroreceptor sensitivity may influence the increasing prevalence of hypertension and cardiovascular diseases.[7] Therefore, a non-pharmacological action or therapy is needed to lower blood pressure in hypertensive patients.

One of which is complementary therapy, using the wet cupping method, a traditional treatment.[8] Research from Saudi Arabia stated that wet cupping therapy reduces systolic blood pressure effectively in hypertensive patients for about 4 weeks, without any serious

side effect.[9] Another previous research stated that the location of the cupping point in the treatment of hypertension only focuses on two points.[10] From some previous research results, no one has discussed specifically the increase in baroreceptor sensitivity by looking at indicators of blood pressure and heart rate.

Other research stated there are six theoretical effects produced by cupping therapy. The reduction in pain levels is explained by "Pain-Gate Theory", "Diffuse Noxious Inhibitory Controls" and "Reflex zone theory". Furthermore, muscles relaxation, changes in local tissue structure, and increased blood circulation is explained by the "Nitric Oxide theory". The immunological effect is explained by "Activation of the immune system theory." Toxins release and waste and heavy metals removal are described by "Blood Detoxification Theory".[11] None of these theories has discussed the problem of increasing baroreceptor sensitivity. Therefore, this research aims to determine the effect of wet cupping therapy on increasing baroreceptors sensitivity in hypertensive patients.

## METHOD

This research was conducted in Sidenreng Rappang Regency, South Sulawesi, eastern Indonesia from February to May 2021 and a Randomized Controlled Trial (RCT) design. Before data collection, an approval was obtained from the Research Ethics Commission of STIKES Muhammadiyah Sidrap (No. /KEP/II.3.AU/F/2021), using ethical principles by requesting prior informed consent from respondents. Two groups were involved, namely the intervention group that received wet cupping therapy in addition to anti-hypertensive drugs, and the control which only received anti-hypertensive drugs.

The respondents were those suffering from grade I and II hypertension. The sample met the criteria when they had high blood pressure (systolic and dystolic blood pressure ≥140 mmHg and ≥90 mmHg respectively), ages between 25 and 50 years, and were male. Those having grade III hypertension (systolic and diastolic blood pressure of 180 mmHg and 110 or more), a complicating disease such as DM, and an additional hypertension risk according to hypertension management guidelines (WHO) were excluded.

**<<<Figure 1. Flowchart of research sample recruitment>>>**

Wet cupping therapy procedure, namely measures blood pressure, prepare wet cupping equipments (handsoon, mask, apron, cuppings, cupping pump, lancing, lancet, tray, com, sterile gauze, scissors, and herbal oil), clean the area using herbal oil and put a header

then suction for 3-5 minutes, do a lancing device injury then put the header back on and suction. After 3-5 minutes open header, wipe around clamped area Wet cupping therapy is carried out at three points on the body. The first point is located 2 fingers posterior to the corners of the lower jaw on either side, just below the skull bone at the hairline (*Al-Akhda'ain*). The second point is the upper part of the spine that extends to the neck, at the sixth vertebrae or C7 cervical spine (*Al-Kaahil*). The other point is on both sides of the shoulder blade (*Azh-Zahrul A'la).* In this research, wet cupping therapy was carried out once a month for 3 consecutive months on the 17th, 19th, and 21st of the Arabic calendar (*Hijri*).

The results were blood pressure and pulse measurements. Each measurement was taken in a seated position using a digital oscillometric sphygmomanometer and watched in seconds to minimize biased results. Measurement of blood pressure and pulse was carried out after the wet cupping therapy, then screening every week to determine the average value of the decrease in blood pressure and pulse rate to determine the maximum daily limit for the effect of cupping therapy on blood pressure. Based on the guidelines, patients were advised to rest 3-5 minutes after receiving wet cupping therapy and then carry out blood pressure and pulse measurements in the arm during the initial visit. They were also advised not to consume foods containing nicotine or caffeine for 1 hour before measuring blood pressure. Measurement results was recorded to be documented at least twice per visit. In addition, visits schedule was once a week for the next eight weeks.

The wet cupping therapy has potential side effects according to previous studies, which was evaluted at 2 and 4 weeks after the procedure.

Hypertensive patients number as a population was 172 respondents subjected to the feasibility test. This was filtered based on the research criteria, 68 people were excluded, and 42 refused to participate. Therefore, the remaining 62 were sampled and randomized into intervention and control groups of 31 people each. All the respondents engaged in every follow-up stage after wet cupping therapy for 2, 4, and 6 weeks in both groups (Figure 1).

Statistical analysis was performed using the SPSS version 21.0 program. Blood pressure comparisons were carried out in both groups from the commencement of measurement, to 2 and 4 weeks after the intervention using the paired t-test. A second blood pressure comparison was also performed with a p-value $<0.05$ which was considered significant and the differences in mean blood pressure had a confidence interval of 95%.

## RESULTS

<<<Table 1>>>

Based on the comparison between the control and intervention groups, there was no difference in the respondents' characteristics with a p-value <0.05. Furthermore, the mean age was between 43 and 39 years or middle age group and had a hereditary history of heart disease. The LDL value showed the average cholesterol was moderate, and physical activity was also lacking. Therefore, this result has a homogeneity value between both groups (Table 1).

<<<Table 2>>>

Respondents in the intervention group after receiving the wet cupping therapy did not have serious side effects. Most of them had mild side effects only after a few hours, namely cupping location pain which did not exceed 48 hours. Also, at 2 weeks, little number of respondents felt dizzy, headache, weakness, drowsiness. At 6 weeks after therapy, some still experienced headaches and and dizziness due to their lifestyle, physical activity, and smoking history which they did not control. The side effects for scar infection were not visible during the 2-6 week follow-up process.

<<<Table 3>>>

Baroreceptor sensitivity in hypertensive respondents has a visible difference from lowering blood pressure's mean value. Based on the BP systolic indicator before and after a follow-up of 2 to 4 weeks, there was a significant difference in the elderly based on paired t-test (P = 0.000). This result is different from the measurement after 4 and 6 weeks which indicated no significant difference in systolic BP (P = 0.248) (Table 3). Consequently, the systolic BP at week 4 was within normal limitsand at week 6. However, a mean increase of 1.62 mmHg was discovered in the 6-week follow-up period, therefore the effect limit of wet cupping therapy was only up to week 4 (Table 3).

Differences in the baroreceptor sensitivity on diastolic blood pressure indicators were also significantly different (paired-t-test). Based on the results of diastolic BP between before and after 2 weeks of wet cupping therapy, there was a significant difference (P = 0.000). This was applied to the values of diastolic BP measurement 2 and 4 weeks after the therapy, which had a significant difference (P = 0.000). The results differed from the 4 and 6 weeks of follow-up period, which showed no significant difference (P = 0.583). This is because the mean diastolic BP values at week 4 and 6 were already within normal limits, but there was an average increase of 0.37 mmHg at week 6. Therefore, the limit for the effect of wet cupping

therapy in increasing baroreceptors sensitivity to blood pressure indicators was found at 4 weeks after therapy in both systolic and diastolic BP (Table 3).

<<<Table 4>>>

Table 4 shows there is a significant difference in the baroreceptor sensitivity to the pulse frequency indicator (paired-t-test). Based on the pulse frequency results there was a significant difference between before and after 2 weeks of wet cupping therapy (P = 0.009). The values of diastolic BP measurement at 2 weeks and 4 weeks after therapy had a significant difference (P = 0.016). Also, the 4 and 6 weeks of follow-up period had a significant difference (P = 0.030). This was because the pulse frequency mean value from week 2 to 6 lies within normal limits, but there was an average decrease of 1.96 beats/minute at week 6. Therefore, the wet cupping therapy effect's limit in increasing baroreceptors sensitivity to pulse frequency indicators occured until the 6th week after the therapy.

## DISCUSSION

The research showed a significant difference between the intervention and control groups baroreceptors sensitivity detected through a decrease in systolic bp of 10.02 mmHg, diastolic bp of 9.27 mmHg, and pulse frequency of 2.27 beats/minute after 2 weeks of follow-up. After 6 weeks of follow-up, the wet cupping effect stopped and there was no significant difference in blood pressure in both groups. Meanwhile, there was a difference in pulse frequency from week 2 to 6. These results are consistent with previous research that found a significant difference in systolic blood pressure values between the intervention and control groups after 2 weeks of follow-up.[12] Another Chinese research stated wet cupping lowers blood pressure at the 4th week after therapy.[13] Therefore, it produces an effect lasting for 2-4 weeks but not applied to the pulse frequency.

In comparison, the results of blood pressure before wet cupping therapy were performed at a follow-up period of 2 and 6 weeks. There were significant differences in the intervention as well as in the control groups. However, the decrease in blood pressure was not very significant probably because the follow-up period was too short. The respondents are aware of their blood pressure results and therefore change their diet and daily lifestyle such as physical activity, as well as adhere to a low salt diet. Physical conditions greatly affect the increase in baroreceptors' sensitivity as an autoregulation to blood pressure or heart health.[14] Also, the espondents showed 27.4% in the control group and 29.1% in the intervention group had a history of smoking and lack of physical activity.

An Arabian research carried out using the wet cupping therapy method and comparing blood pressure results before and after 2 months of the procedure showed a significant difference.[15] These differ from the current result which showed the initial period with the follow-up period after wet cupping therapy had an increased baroreceptors sensitivity at week 2 and blood pressure at week 4 was within normal limits. The week 6 had an increase of 1.62 mmHg in systolic BP and 0.37 mmHg in diastolic BP from normal limits at week 4. Meanwhile, there is a difference in pulse frequency from week 2 to 6. The wet cupping is used as an alternative therapy with a time limit effect of 4 weeks in maintaining the baroreceptors' sensitivity as blood pressure and pulse frequency regulators in hypertensive patients.

The process of wet cupping therapy is carried out on every 17th, 19th, and 21st (*hijria*) selected based on Islamic literature.[16] Another research stated it is not carried out on any other day, other than the one recommended by Islamic literature once a month for 3 consecutive months.[17] Therefore, further research is needed on the differences between certain days and other days of wet cupping therapy results for changes in blood pressure and Mean Arterial Pressure (MAP) in hypertensive patients.

Although wet cupping therapy affects the increase in baroreceptor sensitivity by reducing blood pressure and pulse rate indicators. This decrease is influenced by several factors, one of which is the amount of blood removed during suction [11]. But, the amount of blood removed was not measured, hence the greater the blood clots number, the better the result.[18] The mechanism of wet cupping therapy removes toxins mixed with blood or oxidants from the body through the skin surface.[19] This increases blood flow and prevents atherosclerosis, thereby stimulating the baroreceptors sensitivity which provides a stimulus to the autonomic nerves (reduce the sympathetic nerves work). Therefore, inhibiting the vasomotor center which causes vasodilation, leading to decreased blood pressure and pulse frequency.[20]

The mechanism of increasing baroreceptors sensitivity with decreasing blood pressure and pulse frequency through the effect of wet cupping therapy is explained in the "Taibah Theory". This theory states wet cupping therapy dries out intestinal and excess intravascular fluid, as well as harmful metallic substances.[21] Wet cupping also stimulates endogenous nitric oxide production and excretion of accumulated vasoactive substances and free radicals, which leads to reduced blood pressure measurements.[22] Therefore, this therapy is useful for preventing a decrease in baroreceptors sensitivity which stimulates blood pressure and pulse frequency increase.

In this research, wet cupping therapy is believed to be a safe and harmless action because it does not have serious side effects for hypertensive patients. The immediate side effects were only minor pain due to the use of the lancing device and pulling the header, but this did not last long and disappeared after 1-2 days. Another effect is there is a scar that disspears over time, which is within 5-7 days. Dizziness, headache, and weakness were experienced by some respondents but these did not make them withdraw from participating because there were more positive effects they felt after the wet cupping therapy. Previous research stated the side effects of wet cupping therapy are divided into local and systemic side effects.[23]

This research has a good effect, one of which is controlling the respondent's condition after cupping therapy for up to 6 weeks of the follow-up period. The limitation found was that it did not measure the number of blood clots per cupping cup at the points of *Al-Akhda'ain, Al-Kaahil, and Azh-Zahrul A'la*. This is different from previous research because it focuses on determining the sensitivity of the baroreceptor functioning as a regulating system for blood pressure and pulse frequency using the *taibah* theory approach. Therefore, these results are very useful for medical personnel in providing interventions related to the handling and prevention of increased blood pressure in hypertensive patients with wet cupping therapy which has an effect up to 4th week and provides a stimulus to increase baroreceptors in the carotid sinuses.

## CONCLUSION

Wet cupping therapy effectively increases baroreceptors sensitivity which reduces blood pressure and pulse frequency in hypertensive patients up to a limit of 4 weeks, without any serious side effects. Therefore, it deserves to be recommended as a therapy for the prevention of hypertension. Further research needs to pay attention to the number of blood clots per cupping cup and not use anti-hypertensive drugs simultaneously. Research development on the measurement of Mean Arterial Pressure (MAP) is as also recommended.

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Tabla (Table)

Table 1. Comparison of characteristics in each group (n = 62)

| Characteristics | Control group | Intervention group | *P** |
|---|---|---|---|
| Mean Age, years (± SD) | 43.0±6.8 | 39.3±9.1 | 0.146 |
| Mean Length of suffering from hypertension, ratio (± SD) | 6.9±1.8 | 6.6±1.6 | 0.559 |
| Mean low-density lipoprotein, mg / dL (± SD) | 152.3±14.2 | 158.7±16.4 | 0.241 |
| Family history of heart disease, n (%) | 24 (38.7) | 29 (46.8) | 0.152 |
| History of smoking, n (%) | 17 (27.4) | 18 (29.1) | 0.437 |
| Physical activity, n (%) | 15 (24.2) | 13 (21.0) | 0.214 |

SD = standard deviation, and LDL = Low Density Lipoprotein.

Table 2. Frequency of side effects incidence from wet cupping therapy during the period (n = 62)

| Side effects | After the wet cupping treatment | | | Total frequency | Percentage |
|---|---|---|---|---|---|
| | 2 weeks | 4 weeks | 6 weeks | | |
| Cupping location pain | 3 | 0 | 0 | 3 | 9.5 |
| Weak and sleepy | 6 | 1 | 0 | 7 | 21.4 |
| Headache | 1 | 0 | 7 | 8 | 38.1 |
| Suction cup-head | 21 | 0 | 0 | 21 | 76.2 |
| Dizzy | 3 | 0 | 5 | 8 | 38.1 |

Table 3. Comparison of baroreceptor sensitivity to blood pressure indicators after 2 to 6 weeks of wet cupping therapy

| Difference in measurement results (n=31) | Mean difference±SD | Min-Max (CI95%) | t | *P** |
|---|---|---|---|---|
| TD Systole (mmHg) | | | | |
| Before therapy➔after 2 weeks | 22.17±7.01 | 18.52-25.84 | 14.72 | <0.001 |
| After 2 weeks➔after 4 weeks | 10.82±6.18 | 8.0-12.65 | 7.59 | <0.001 |
| After 4 weeks➔after 6 weeks | -1.62±5.81 | -4.36-2.03 | -1.34 | 0.248 |
| TD Diastol (mmHg) | | | | |
| Before therapy➔after 2 weeks | 6.32±6.56 | 3.05-8.03 | 4.01 | 0.001 |
| After 2 weeks➔after 4 weeks | 9.27±7.14 | 6.38-10.24 | 6.54 | <0.001 |
| After 4 weeks➔after 6 weeks | -0.37±6.38 | -3.65-3.08 | -2.74 | 0.583 |

P * <0.05; BP: blood pressure; SD: standard deviation; CI: 95% of confidence interval; and t: student's t test.

Table 4. Comparison of the sensitivity of the baroreceptors to pulse rate indicators after 2 to 6 weeks of wet cupping therapy.

| Difference in measurement results (n=31) | Mean difference±SD | Min-Max (CI95%) | t | *P** |
|---|---|---|---|---|
| Pulse rate (times / minute) | | | | |
| Before therapy➔after 2 weeks | 2.27±3.71 | 0.63-3.92 | 2.88 | 0.009 |
| After 2 weeks➔after 4 weeks | 2.0±3.57 | 0.42-3.58 | 7.59 | 0.016 |
| After 4 weeks➔after 6 weeks | 1.96±3.95 | 0.21-3.70 | 2.32 | 0.030 |

P * <0.05; BP: blood pressure; SD: standard deviation; CI: 95% of confidence interval; t: student's t test.

Figura (Figure)