

Original Article

Lipid-Modulating Effects of Al-Hijamah (Wet Cupping) on Hypertensive Sudanese Patients: A Prospective Case-Control Study

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Abstract:

Background: Cupping therapy, particularly the traditional wet cupping method known as Al-Hijamah, is an ancient medical practice still widely used in Sudan and many other cultures. Although it has been traditionally applied to manage cardiovascular disorders such as hypertension, scientific evidence supporting its efficacy remains limited. This study aimed to establish a biochemical profile of Sudanese hypertensive patients undergoing Al-Hijamah, focusing on its potential lipid-modulating effects. **Methods:** A prospective, interventional case-control study was conducted in two cupping therapy centers in Khartoum State, Sudan. A total of 67 participants were enrolled, comprising 40 hypertensive patients and 27 normotensive controls. Blood samples were collected at three time points: before cupping, from the cupped blood, and one-week post-cupping. Samples were analyzed for total cholesterol, low-density lipoprotein (LDL), high-density lipoprotein (HDL), and triglycerides. **Results:** Among hypertensive

participants, total cholesterol decreased significantly from 225.7 mg/dL to 197.3 mg/dL, (Purification Index, PI = 13%). LDL cholesterol showed a (PI = 12%) reduction (from 154.5 mg/dL to 136 mg/dL). Triglycerides declined modestly by 7.7% in the hypertensive subjects, while controls exhibited an 18% reduction. HDL levels remained largely unchanged in both groups following intervention. **Conclusion:** Al-Hijamah demonstrated notable lipid-lowering effects, particularly in reducing total and LDL cholesterol levels in hypertensive patients, although it should not replace conventional antihypertensive therapy. Al-Hijamah may serve as a valuable complementary, non-pharmacological intervention, especially in low-resource settings. Further large-scale, controlled studies are recommended to confirm these findings and elucidate underlying mechanisms.

Keywords: Al-Hijamah, cholesterol, hypertension, LDL, Sudanese, wet cupping

Introduction:

Cupping therapy is one of the oldest medical practices, with origins dating back more than four millennia ⁽¹⁾. Prominent Islamic physicians, including Ibn Sina (Avicenna), Al-Zahrawi, and Al-Razi, integrated cupping into their therapeutic repertoires ⁽²⁾. Today, it remains culturally embedded and officially recognized in countries such as Germany, Norway, Denmark, Saudi Arabia, Egypt, India, and China ⁽³⁾. In low-resource regions across Asia and Africa—where access to pharmaceutical treatments is often inconsistent—up to half of the population relies on traditional and complementary therapies due to their affordability, accessibility, and cultural resonance ⁽⁴⁾. Among these modalities, Al-Hijamah (traditional wet cupping) has been linked to improvements in cardiovascular health, including hypertension, heart failure, arrhythmia, and even myocardial infarction. Animal studies have further demonstrated reduced infarct size following Al-Hijamah, suggesting cardioprotective mechanisms ⁽⁵⁾. Additionally, some studies indicate that Al-Hijamah facilitates the removal of substances such as excess iron, ferritin, cholesterol,

triglycerides, LDL, uric acid, and urea from the bloodstream and interstitial fluids,

thereby promoting physiological balance ⁽⁶⁾. Conventional cupping techniques have evolved to include safety and standardized protocols and are recognized for potentially improving blood rheology and clearing pro-inflammatory and lipid byproducts. Studies indicate that cupped blood differs significantly from venous blood, supporting its detoxifying function ⁽⁷⁾. Nevertheless, the scientific evidence remains limited by small sample sizes and inconsistent measurement intervals ⁽⁸⁾. Recent studies strengthen this evidence base: In a 2024 Indonesian meta-analysis highlighted positive effects of Al-Hijamah on both hypertension and dyslipidemia, though it noted heterogeneity across studies⁽⁹⁾. Similarly, a 2024 Jordanian clinical trial among adult women documented significant post-cupping reductions in triglycerides and improved HDL/LDL ratios ⁽¹⁰⁾. These emerging data underscore the need for rigorous biochemical monitoring following wet cupping. Beyond lipid modulation, the burden of hypertension itself demands urgent attention. Hypertension remains a global health

challenge⁽¹¹⁾ because hypertension is a major risk factor for diseases such as heart disease, kidney failure, diabetes mellitus, and stroke⁽¹²⁾. According to the World Health Organization (WHO), approximately one billion people worldwide have hypertension, two-thirds of whom are in developing countries with limited access to healthcare resources⁽¹³⁾. In Sudan, where Al-Hijamah is deeply ingrained in cultural health practices⁽¹⁴⁾, hypertension is increasingly prevalent, while pharmaceutical access remains inadequate. Therefore, culturally aligned, low-cost, and accessible interventions like Al-Hijamah merit scientific attention. This study aims to rigorously evaluate the biochemical effects of Al-Hijamah as a complementary treatment for hypertension among Sudanese patients, focusing on lipid profile alterations and cardiovascular implications. By contributing robust, localized evidence, and to bridge the gap between traditional practices and modern healthcare in resource-constrained settings.

Methodology:

Study Design: A prospective, interventional comparative study was conducted in two cupping centers in Khartoum State, Sudan: Aleinaaia Hijamah Center (Omdurman) and

Haja Asma Hijamah Center (Algerif, Khartoum).

Study Population: The study included Sudanese patients diagnosed with hypertension who sought Al-Hijamah therapy and a control group consisting of apparently healthy individuals, including both males and females who underwent Al-Hijamah to improve general well-being and met the study's inclusion criteria.

A total of 67 participants (40 hypertensive patients and 27 controls) contributed 201 blood samples (three per participant).

Inclusion Criteria: Hypertensive patients included individuals diagnosed with hypertension, regardless of other chronic diseases or antihypertensive medication use. Inclusion criteria for the control group included apparently healthy individuals who voluntarily underwent Al-Hijamah to enhance their general health.

Data collection: data were collected using a pre-tested structured questionnaire divided into three sections: demographic data, information about the hypertension history, and the biochemical parameters of investigation which were carried. Three samples were collected per participant: before Al-Hijamah (baseline venous sample), during Al-Hijamah (from the cupping cup), and one week after Al-Hijamah.

Biochemical Analysis: The level of the biochemical parameters was measured by purification index (PI) using the formula : $PI = 100 \times [(Initial\ concentration - After\ concentration) / Initial\ concentration]$.⁽⁴⁾The approach used involved utilizing cholesterol oxidase/peroxidase kits sourced from Biosystems (Spain) and a cholesterol HDL precipitating reagents. Cholesterol and triglycerides were quantified via spectrophotometry at 500 NM, following enzymatic oxidation-peroxidation reactions forming a measurable color complex. HDL, was isolated using precipitation methods, then quantified according to manufacturer protocols. LDL concentration was calculated using the Friedewald equation⁽¹⁵⁾.

Statistical Analysis: The collected data were statistically analyzed using the Statistical Package for the Social Sciences (SPSS) version 25, to assess differences before and after intervention, as well as between hypertensive and control groups.

Ethical Considerations: Ethical approval was obtained from the Ethical Committee at Al Zaiem Al Azhari University, Faculty of Medicine. All participants were fully informed about the purpose of the study and

the procedures involved. Informed consent was obtained from all participants, ensuring their willingness to be part of the study. Confidentiality and security of participant data were maintained. All personal identifiers were removed prior to analysis to ensure participant anonymity; ensuring that the data was used solely for the purpose of the study. Participants received feedback on their laboratory results, and permission was granted by the managers of Al-Hijamah centers before data collection.

Results

The age distribution of the study population showed that the largest proportion of hypertensive patients fell within the 53–67 years age group (19 participants, 47.5%). This was followed by those aged 38–52 years (13 participants, 32.5%), 68–82 years (6 participants, 15%), and one participant (2.5%) aged above 83 years. Regarding the control group, the highest proportion was observed in the 23–37 years age group (37%), followed by the 38–52 years group (33%). Patients aged 53–67 years accounted for 25.9%, while those aged 68–82 years represented the lowest proportion (3.7%).

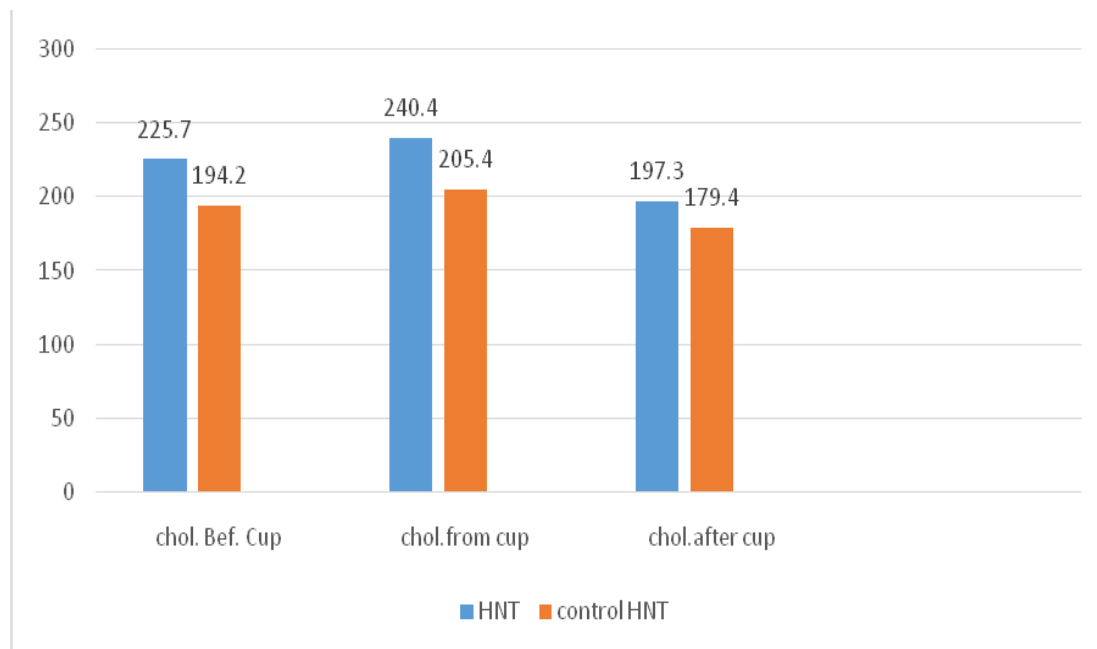


Figure (1): The effect of Al-Hijamah (wet cupping) on serum cholesterol (mg/dl) in hypertensive and control

Among hypertensive patients, as illustrated in Figure (1), the purification index (PI) for serum cholesterol was higher (13%) compared to the control group (7.6%), the mean serum cholesterol levels in hypertensive patients were 225.7 mg/dl before cupping, increased to 240.4 mg/dl during cupping, and decreased to 197.3 mg/dl after cupping. In the control group, cholesterol levels were 194.2 mg/dl before cupping, 205.4 mg/dl during cupping, and 179.4 mg/dl after cupping.

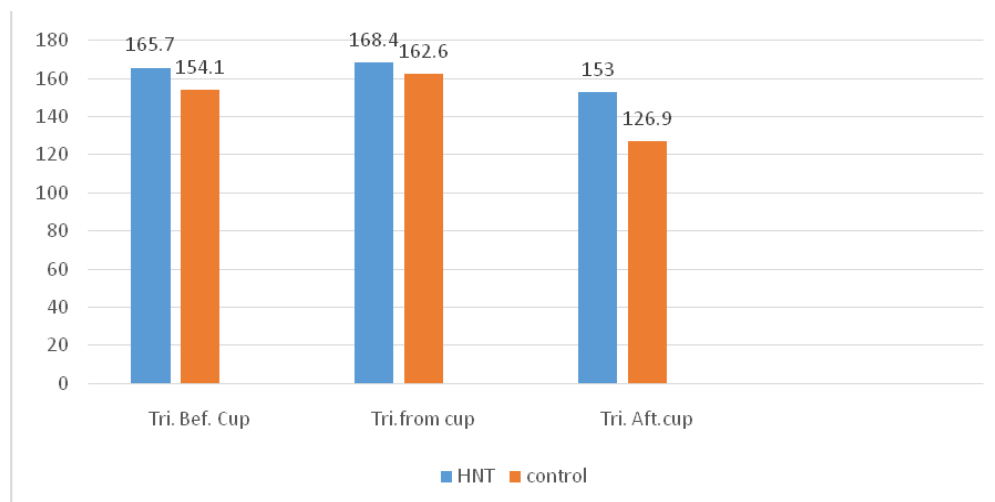


Figure (2): The effect of Al-Hijamah (wet cupping) on serum triacylglycerol in (mg/dl) in hypertensive and control

Figure (2) demonstrates the effect of cupping on triacylglycerol levels. The PI was lower in hypertensive patients (7.7%) compared to the control group (18%). In hypertensive patients, triacylglycerol levels increased slightly from 165.7 mg/dl before cupping to 168.4 mg/dl during cupping, then decreased to 153 mg/dl after cupping. In contrast, the control group showed a more marked reduction, with levels rising from 154.1 mg/dl to 162.6 mg/dl during cupping, then dropping to 126.9 mg/dl post-cupping. These findings suggest a more pronounced effect of cupping on triacylglycerol levels in the control group.

As shown in table (1), the purification index for LDL was identical in both hypertensive and control groups (12%). In hypertensive patients, LDL levels increased from 154.5 mg/dl before cupping to 169.8 mg/dl during cupping, followed by a reduction to 136 mg/dl after cupping. In comparison, the control group exhibited a consistent decrease in LDL levels from 118.9 mg/dl before cupping to 112 mg/dl during cupping and 104.6 mg/dl after cupping.

Table (1) The effect of Al-Hijamah (wet cupping) on serum LDL (mg/dl) in hypertensive patients and their control group.

Category	HINT	Control
Level of LDL before Al-Hijamah	154.5mg/dl	118.9 mg/dl
Level of LDL from the cup	169.8 mg/dl	112.0 mg/dl
Level of LDL after Al-Hijamah	136.1 mg/dl	104.6mg/dl

Figure (3) illustrates minimal changes in HDL levels following cupping. The PI for HDL was 9.5% in hypertensive patients and 5.5% in the control group. In hypertensive patients, HDL levels increased slightly from 33.2 mg/dl to 34.9 mg/dl during cupping, then decreased to 30 mg/dl after cupping. In the control group, HDL levels showed a gradual decline from 48.8 mg/dl before cupping to 47.7 mg/dl during cupping and 46.1 mg/dl after cupping.

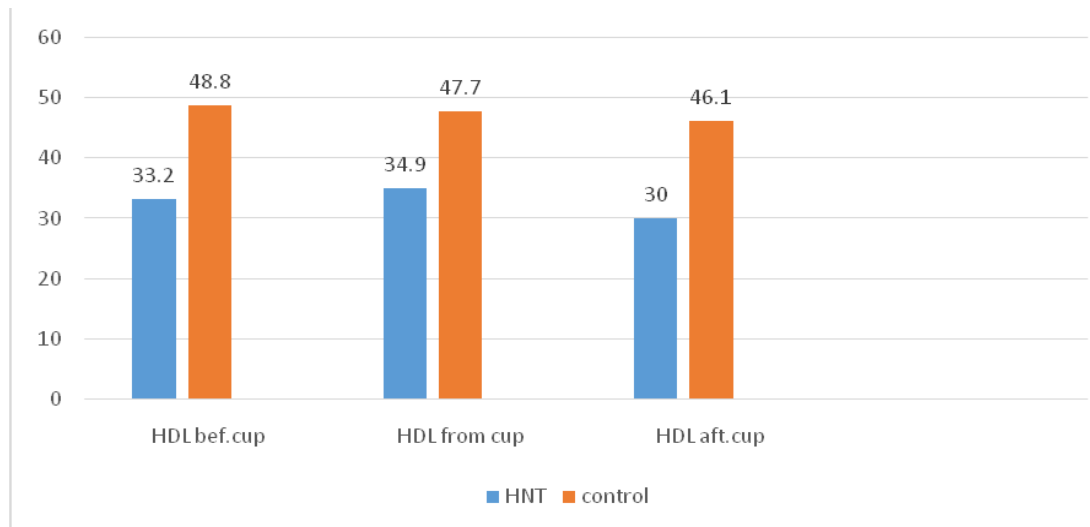


Figure (3):The effect of Al-Hijamah (wet cupping) on serum HDL (mg/dl) in hypertensive and control.

Overall, these findings indicate that Al-Hijamah (cupping therapy) has varying effects on lipid profile parameters, including cholesterol, triacylglycerol, LDL, and HDL levels. The observed differences between hypertensive patients and the control group suggest a potential role of cupping therapy in modulating cardiovascular risk factors associated with hypertension.

Table (2) Comparison between Layla's study and our study

Biochemical marker	Sample	Layla study ²⁰	Our study
s. cholesterol	Before	209	225.7
	After	194.89	197
TG	Before	149.6	165.7
	After	151	153
LDL	Before	155	154.5
	After	139	136
HDL	Before	40.23	33.2
	After	41.38	30

Discussion:

This study reinforces the expanding body of evidence supporting the therapeutic potential of Al-Hijamah as both a standalone and adjunctive treatment modality. Our findings align with previous research suggesting that Al-Hijamah serves as effective complementary intervention when applied alongside conventional pharmacological treatments ⁽⁷⁾. Although not intended as a

substitute for medications, Al -Hijamah appears to enhance the overall therapeutic efficacy without causing chemical interactions or pharmacological antagonism ^(16, 17). Its mechanical nature ensures safe co-application with drugs, particularly in conditions characterized by fluid overload such as hypertension, vascular congestion, circulatory overload, and edema ⁽¹⁸⁾.

The clinical outcomes observed in this study support the premise that Al-Hijamah contributes to improvements in blood parameters, specifically cholesterol, triacylglycerol, and LDL levels. As depicted in Figures 1–3 and table (1), these biochemical improvements appear to translate into reduced blood pressure and more favorable lipid profiles, potentially delaying the onset or progression of atherosclerosis ⁽⁴⁾. These results are consistent with earlier studies and highlight the physiotherapeutic effects of cupping therapy, including enhanced microcirculation and alleviation of peripheral ischemia ⁽¹⁷⁾.

Quantitatively, our results revealed significant reductions in lipid parameters, with purification indices (PI) of 13% for cholesterol, 7.7% for triacylglycerol, and 12% for LDL. Such reductions, especially among hypertensive patients, suggest that Al-Hijamah may exert a preventive benefit on cardiovascular disease. Furthermore, by potentially reducing the required dosage or frequency of pharmacological treatments, this practice may help alleviate economic burdens for patients and healthcare systems.

Notably, the differential impact of Al-Hijamah across patient groups is compelling. Hypertensive participants showed a higher

cholesterol PI (13%) compared to controls (7.6%), while the control group demonstrated a higher triglyceride PI (18%) compared to hypertensive participants (7.7%). These variations suggest a context-dependent efficacy of Al Hijamah, possibly indicating that individuals with hypertension may experience more pronounced benefits. Serum lipid analysis before and after Al-Hijamah further validated its impact. In the control, serum cholesterol decreased from 194 mg/dl to 179 mg/dl, triglycerides from 154 mg/dl to 126 mg/dl, and LDL from 118 mg/dl to 104 mg/dl, whereas HDL showed a modest decline from 48.8 mg/dl to 46.1 mg/dl. These findings are consistent with those reported by Alshowafi ⁽¹⁸⁾ and reinforce Al-Hijamah's potential in improving lipid metabolism.

A distinguishing feature of this study was the wide age range of participants (23–83 years), which provides broader generalizability than previous studies, which often had narrower age brackets ^(4, 18–20). The relatively large and gender-balanced sample size further strengthens the external validity of our findings. Interestingly, biochemical substances were found at higher concentrations in cup-extracted blood compared to venous blood pre- and post-treatment. These results are in agreement with Mahdavi et al. ⁽⁴⁾ and suggest that Al-

Hijamah may preferentially extract lipids and other waste materials, as evidenced by similar LDL values between our study (18.4 mg/dl) and theirs (12.36 mg/dl). In contrast, Bilal ⁽¹⁸⁾ reported reductions in cholesterol, LDL, HDL, and triglycerides in cupped blood versus venous blood.

Our results also echo findings from Mustafa et al. ⁽²⁰⁾, where cupping therapy led to significant decreases in total cholesterol, LDL cholesterol, and the LDL/HDL ratio in patients with hyperlipidemia table ⁽²⁾. However, in both their study and ours, no significant changes were observed in HDL levels to the same extent. Intriguingly, while our study demonstrated a 28.7 mg/dl decrease in cholesterol—double that reported by Mustafa et al. (14 mg/dl)—changes in LDL levels were comparably close (18.5 mg/dl vs. 16 mg/dl, respectively). The greater reduction in triacylglycerol observed in our study (12.7 mg/dl) compared to Mustafa's (minimal change) may point to a population-specific response or procedural variation. Moreover, even with equal LDL purification indices (12%) in both hypertensive and control groups, the LDL concentration in cupped blood was higher in hypertensive patients (169.8 mg/dl) than in controls (112 mg/dl), indicating differing baseline lipid burdens and possibly greater efficacy of Al-

Hijamah in patients with elevated cardiovascular risk.

In line with the teachings of the Prophet Muhammad (peace be upon him), where cupping is recognized as a healing method ^(21, 22), the present findings affirm the potential health benefits of this traditional therapy. The integration of spiritual, historical, and empirical evidence adds a rich dimension to the clinical understanding of Al-Hijamah.

In conclusion, our study adds to the growing evidence base supporting Al-Hijamah as a promising complementary therapy for managing hypertension and dyslipidemia. Future research should focus on uncovering the specific physiological mechanisms underlying its effects and establishing standardized protocols to enhance its integration into modern medical practice.

Conclusion:

Comparison of the biochemical profile of hypertensive patients who underwent Al-Hijamah with the normal population showed a reduction of all major lipid parameters, which emphasized that Al-Hijamah is a valuable complementary remedy. Based on the findings of this investigation, Al-Hijamah proved to be an effective complementary therapy for Sudanese hypertensive patients

and may serve as a supportive approach for managing dyslipidemia and cardiovascular risk. Moreover, a notable level of awareness and acceptance of Al-Hijamah was observed among Sudanese hypertensive patients, reflecting its cultural relevance and trust as a traditional healing method.

Recommendation

1. Expand Research on Metabolic Disorders:

Future researchers are encouraged to extend studies on the effect of Al-Hijamah (wet cupping) on different types of metabolic disorders in Sudanese population. Comprehensive biochemical and clinical research in this area will provide valuable insights into the potential benefits of Al-Hijamah in managing metabolic conditions.

2. Establish Al-Hijamah units in hospitals: It is advisable to establish dedicated Al-Hijamah units within hospital settings in Sudan. These units should maintain sterility and provide a conducive and healthy environment for Al-Hijamah procedures. The data collected from such units can significantly contribute to scientific research and enhance the understanding of Al-Hijamah's therapeutic benefits.

3. Promote integration with modern healthcare: collaboration between traditional practitioners and healthcare professionals

should be encouraged to ensure safe, evidence-based application of Al-Hijamah. Integrating this practice within the broader healthcare system may improve accessibility, patient satisfaction, and holistic care outcomes.

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