

## Research Article

# The Effects of Wet Cupping Therapy on the Blood Levels of Some Heavy Metals: A Pilot Study

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### KEYWORDS

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### Abstract

**Background and aim:** Heavy metals have been recognized as toxins for centuries. Cupping therapy has been shown to aid in the excretion of accumulated fluids and toxins from the interstitial fluid. The aim of this study was to investigate the effects of wet cupping therapy on blood levels of heavy metals.

**Methods:** Thirteen healthy male individuals [mean age  $\pm$  standard deviation,  $28.47 \pm 6.18$ ] participated in this study. Venous blood samples were collected 5 min before and 30 days after the wet cupping therapy. Five points of the posterior neck and bilateral perispinal areas of the neck and thoracic spine were selected for cupping therapy. The levels of aluminium (Al), zinc (Zn), and cadmium (Cd) were measured using an atomic absorption spectrophotometer.

**Results:** The levels of heavy metals (Al, Zn, and Cd) after cupping therapy were significantly lower than the levels before therapy.

**Conclusions:** These results suggest that wet cupping therapy has an excretory effect on the kidney. Wet cupping therapy may clear blood from excess heavy metals.

## 1. Introduction

Cupping therapy is a traditional application dating back as far as 2,000 years. In practice, there are different types of cupping therapy, which include needle cupping, dry or moving cupping, retained cupping, bleeding cupping (wet cupping), and medicinal (herbal) cupping. However, wet

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cupping is the most commonly used type of cupping therapy [1]. Cupping therapy involves creation of a vacuum over specific points on the skin, using different application techniques [2]. This therapy is gradually gaining recognition in different parts of the world because of its ability to alleviate symptoms of several ailments. For instance, it was reported that dry cupping therapy decreased upper shoulder and neck pain in office workers [3]. The beneficial effects of this therapy have been reported for heart diseases [4, 5] and other maladies that affect humans [6, 7]. However, the effect of cupping therapy on the concentration or levels of different substances or components in blood has not been unequivocally established.

A recent study revealed differences in the levels of certain substances in venous blood and wet cupping blood, suggesting that wet cupping therapy may exert certain influence on hematological indices. Indeed, wet cupping blood obviously had higher oxidants than venous blood. The authors concluded that wet cupping therapy exerts a positive effect on excretion of oxidants from the body [8]. But, changes that accompany the individual's blood after a session of wet cupping therapy have not been fully investigated. The extent of sustained changes after wet cupping therapy has not been reported.

The main effect of wet cupping therapy is associated with precipitation of blood circulation, thereby removing blood stasis and waste from the body. In addition, local damage to the skin and capillary vessels due to application of this therapy acts as nociceptive stimuli that trigger nervous system-mediated excretion of certain substances from the body [2]. Indeed, this therapy has been reported to stimulate the peripheral [9, 10] and autonomic nervous systems [2]. It is believed that cupping therapy removes noxious substances from the skin microcirculation and interstitial fluid compartment [9, 10], drains excess fluid, and increases cutaneous and muscle blood flow [9]. Thus, wet cupping therapy is a promising complementary therapeutic option that enables the organism get rid of noxious substances and waste products from the body. The myriad effects resulting from the application of this therapy are believed to involve stimulation of some neurohormones and the immune system [2].

Although investigation of the impact of cupping therapy on the excretion of substances (including toxins) in the body fluid has gained considerable attention and interest, almost nothing is known about the effect of cupping therapy on the level of heavy metals (toxic elements) in the blood. Heavy metals are toxic (nonessential) metals (type D heavy metals) with no known nutritive value. The nonessential metals cause substantial toxicity (harm) to the body. Toxic metals include mercury (Hg), cadmium (Cd), lead (Pb), arsenic (As), mercury (Hg), and selenium (Se) and some oxyanions or organic ions (e.g., methylmercury, MeHg) [11, 12].

Heavy metals have been recognized as toxins for centuries [13]. The problem posed by exposure of heavy metals to human health requires attention. Heavy metal pollution remains a serious issue, having lethal and sublethal effects on the organism and the ecology as a whole. Heavy metal pollutants differ from other pollutants in that they are not destroyed and they occur naturally in the environment [14, 15]. Recent data have shown that emissions of some heavy metals have dramatically increased over the past decades [16]. Humans frequently encounter toxic metals, mostly from

sea food and industrial emissions, and many persons are known to exceed the exposure limit, which may result to such health effects as neurological, bone, and kidney disorders [14, 16].

Unfortunately, there are currently no known effective physiological mechanism or pharmacological treatment to excrete these noxious substances from blood and interstitial fluids. In a previous study, it was reported that the level of heavy metals in wet cupping blood was higher than in the venous blood collected 5 minutes before therapy in healthy individuals [17]. Unfortunately, the study did not report levels of heavy metals in venous blood after therapy. More so, whether or not the effect of wet cupping therapy on the level of heavy metals in blood is sustained over a period is not fully known. Furthermore, there is no known treatment modality that can purify both blood and interstitial fluids from toxic metals. Therefore, wet cupping may be an effective option in removing toxins from the body. In the present study, we investigated whether or not wet cupping therapy, in a sustained manner, decreases the blood levels of heavy metals, measured before and 1 month after the therapy in young healthy humans.

## 2. Materials and methods

### 2.1. Participants

Thirteen healthy individuals [mean age  $\pm$  standard deviation,  $28.47 \pm 6.18$ ] participated in this study. The participants fulfilled the inclusion criteria for the study.

### 2.2. Inclusion criteria

1. Absence of any health problem based on recent medical examination.
2. Willingness to participate.
3. Total abstinence from drugs.

### 2.3. Exclusion criteria

1. Unwillingness to participate in the study.
2. Persons with serious conditions such as diabetes mellitus, infectious disease, malignancy, and systemic and immune disorders were excluded from the study.
3. Because wet cupping is a relatively invasive procedure, individuals having blood-borne diseases or hemostatic abnormalities or taking anticoagulants or antiplatelet agents were excluded.

### 2.4. Procedure

The experimental protocol was in line with the Declaration of Helsinki and approved by the local ethics committee. The aims and objectives of the study were explicitly explained to the participants before commencing the experiment. All participants gave written informed consent to participate in the study a day before the commencement of the study. Venous blood samples were collected twice (before and after therapy) for determination of the level of heavy metals. Wet cupping therapy was performed by one of the authors (S.D.).

## 2.5. Blood collection

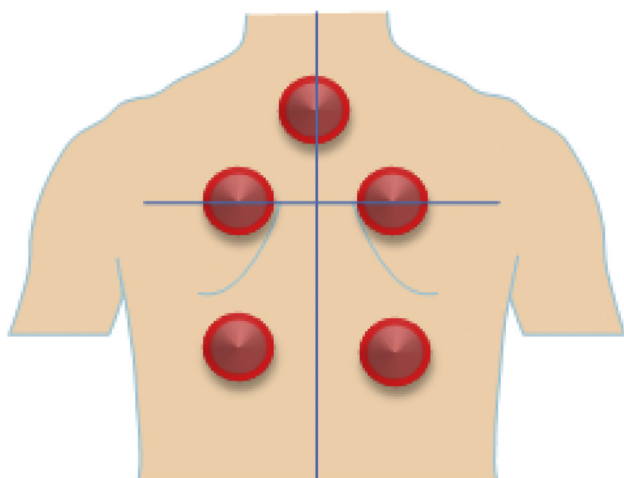
Venous blood samples were collected 5 minutes before and 30 days after wet cupping therapy. Blood samples were placed in collection tubes specific for trace element analysis (navy blue cap tubes). All samples were stored as whole blood at +4 °C until analysis.

## 2.6. Wet cupping therapy

The cupping therapy was carried out by one of the authors (S.D.), a certified physician of the British Cupping Society and National Health Institute. The therapy was performed according to a previously reported method [17–19] with modifications. To perform the therapy, sterile disposable cups measuring about 5 cm in diameter were used. First, five points of the posterior torso—bilateral perispinal areas of the neck and thoracic spine, selected for the procedure, were cleaned with antiseptics (Fig. 1). Disposable cups were gently placed at the posterior neck and thoracic spinal regions, mentioned previously, and negative pressure was applied using a cupping (vacuum) pump. The cups were removed after about 2–3 minutes. Twenty-six-gauge disposable lancets were used to puncture to a depth of 2 mm on the areas of the skin to which cupping pressure was applied. Thereafter, vacuum pumping was applied for the second time, draining about 3–5 cm<sup>3</sup> of blood per cupping site. The application sites were covered with sterile pads. As a measure against negative reactions (such as fainting) due to bloodletting or pain intolerance, an emergency physician and a nurse with emergency response kit were ready in the application room to promptly respond to negative consequences that would occur during the procedure. There was no adverse reaction experienced during the procedure.

## 2.7. Determination of the levels of heavy metals

The levels of the heavy metals of interest were measured using an atomic absorption spectrometer



**Figure 1** Posterior torso showing points on the skin in which wet cupping therapy was applied.

(210VGP Atomic Absorption Spectrophotometer, Buck Scientific Manufacturing Company, East Norwalk, CT, USA). The heavy metals (Al, Zn, and Cd) were determined after microwave-assisted digestion of the samples using a HCl–HNO<sub>3</sub> acid mixture of 1:1 ratio (i.e., 5 ml conc. HCl + 5 ml conc. HNO<sub>3</sub>). The samples were digested for 4 min at 300W. The digestion was stopped when a colorless solution was obtained. Thereafter, the solution was evaporated to dryness. The solution was diluted with deionized water. These heavy metals were considered for analysis as they pose greater threats to human health even at a sublethal dose. More so, recent data suggest that the health hazard associated with exposure to some of these heavy metals occur at lower levels of exposure than previously thought [16].

## 2.8. Statistical analysis

The SPSS statistical software package (version 16.0 for windows; SPSS Inc., Chicago, Illinois, USA) was used to perform all statistical calculations. Results are expressed as mean ± standard error of the mean. Distributions were evaluated by using One-Sample Kolmogorov–Smirnov test. A two-tailed paired *t* test was used to compare as appropriate. Differences were considered statistically significant at *p* < 0.05.

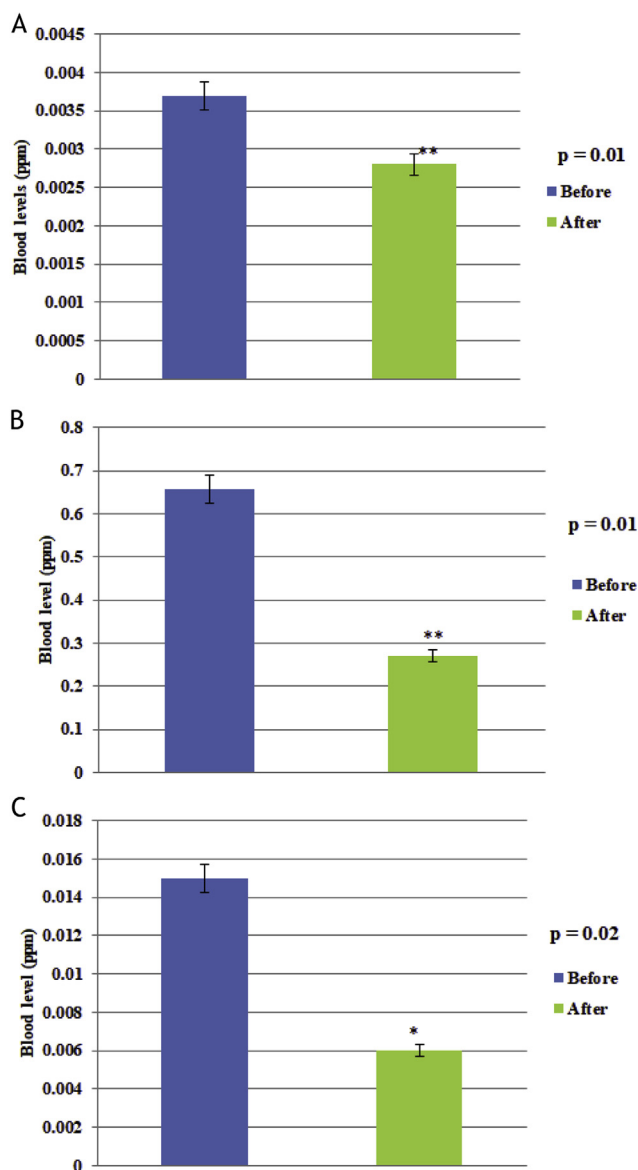
## 3. Results

The venous blood levels of some blood heavy metals (Al, Zn, and Cd) after wet cupping therapy were significantly lower than the levels before therapy (Fig. 2A, B and C).

## 4. Discussion

The results of this study indicate that wet cupping therapy can be effective in aiding the excretion of excess heavy metals from the blood. Accumulation of heavy metals in the body leads to destruction of lipids, protein, enzymatic, and DNA functions. This destructive nature of heavy metals is mediated, at least in part, via the production of free radicals. Accumulation of excess heavy metals is due to their biological nondegradability [20, 21]. The toxicity of heavy metals on the target organs depends on the form and species of the metals [14]. The metals considered in this study (Al, Zn, and Cd) are some of the heavy metals with public health significance. Their exposure, even at a relatively low dose, can lead to multiple organ damage due to their high level of toxicity, genotoxicity, and carcinogenicity [21, 22].

The continuous and extensive use of heavy metals in industry and technology makes their exposure to still remain a widespread occupational and environmental problem in the world [23]. Heavy metal contamination on humans has adverse effects resulting from not only high-level accumulation in the body but also chronic low-level exposure [24]. In recent years, there has been an increasing ecological and global public health concern associated with environmental contamination by these metals. Accumulating evidence indicates that heavy metals



**Figure 2** Venous blood levels 5 minutes before and 30 days after wet cupping therapy. (A) Aluminum. (B) Zinc. (C) Cadmium.

can cause or contribute to various diseases and some chronic illnesses, including birth defects, decrease in children intelligence quotient, memory loss, infertility, seizures, and many idiopathic illnesses [19, 21, 24]. To this end, research directed toward development of techniques that will enable the excretion or removal of these toxic metals is substantially justified.

The first measure against heavy metals toxicity is to take preventive measures. It is believed that deficiencies in zinc, iron, and vitamins such as thiamine increase the absorption of dangerous heavy metals. Thus, maintaining nutritional health is one of the best measures to minimize metal exposure, accumulation, and toxicity [23]. The results of this study have revealed that wet cupping therapy can be effective in getting rid of hazardous metals from the body. In the present study, the venous blood levels of some blood heavy metals (Al, Zn, and Cad) obtained 30 days after

wet cupping therapy were statistically lower than the level before therapy. This result indicates that wet cupping therapy has a substantial effect on the blood level of toxic metals by removing these hazardous agents from the blood.

The effect of wet cupping therapy has also been investigated on other biochemical parameters and was found to be an effective therapeutic option. For example, the report of Niasari et al suggested that wet cupping may be an effective method for reducing low-density lipoprotein cholesterol in men and consequently may have a preventive effect against atherosclerosis [25]. In addition, wet cupping therapy was found to be an effective therapeutic option in disorders caused by iron overload as seen in hemochromatosis [26–29].

For the first time in the literature, the present study showed that venous blood levels of some heavy toxic metals significantly decrease 30 days after wet cupping therapy compared with the level before therapy. These results are consistent with those of the previous study [17] and other studies that recommended wet cupping therapy for treatment of iron overload in beta thalassemia major, hemochromatosis, and sideroblastic anemia [27–29].

## 5. Conclusions

Wet cupping therapy significantly reduced the level of heavy metals (Al, Zn, and Cd) 30 days after therapy. This may be, at least in part, due to the ability of this therapy to significantly trigger their excretion. Although not completely understood, the mechanisms underlying this phenomenon may involve the activation of certain neuro-hormones as well as the nervous system functions. Wet cupping therapy may be recommended as an effective complementary medicine treatment option in diseases that are characterized by accumulation of toxic metals in the body.

## Disclosure statement

The authors have no conflicts of interest related to this work.

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