

Is it possible to remove heavy metals from the body by wet cupping therapy (*Al-hijamah*)?

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Wet cupping therapy (WCT) is a traditional blood-letting method recommended for treating a lot of diseases. *Al-hijamah* is WCT of prophetic medicine that's also called the triple S technique that includes skin suction, scarification and second suction. Its mechanism of action is still unknown but it is believed to remove toxic substances from the body according to the evidence-based Taibah mechanism (Taibah theory). In this study, the aim was to compare wet cupping blood and venous blood samples in terms of heavy metals concentrations. 24 healthy volunteers were enrolled in this study. After venous blood samples were drawn, WCT (*Al-hijamah*) was performed and wet cupping blood samples were taken. In order to measure the levels of heavy metals all samples were analyzed by Inductively Coupled Plasma Mass Spectrometry (ICP-MS). In the present study, all levels of selected heavy metals were significantly higher in wet cupping blood than venous blood. It may be possible to remove heavy metals from the body through wet cupping therapy.

Keywords: Wet cupping therapy (*Al-hijamah*), Aluminum, Lead, Mercury, Silver, ICP-MS

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WCT is a kind of simple, effective, repeatable and economic complementary treatment modality. In WCT (*Al-hijamah*), negative pressure applied to the skin surface using cups creates skin uplifting. According to the evidence-based Taibah mechanism (Taibah theory)¹⁻⁵, this causes increased capillary filtration with local collection of filtered fluids as well as interstitial fluids which becomes retained inside skin uplifting. The scarifying skin surface at skin uplifting opens the skin barrier, applying sucking cups (for the 2nd time) creates a pressure gradient and a traction force across the skin leading to excretion of collected interstitial fluids.

Cupping (both dry and wet) therapy has been asserted to drain accumulated fluids, toxins and other chemical compounds such as lipids from interstitial fluid to blood and lymphatic capillaries (Taibah mechanism)¹⁻⁵. Dry cupping may cause the drainage of interstitial fluid and its normal and abnormal elements into blood and lymphatic capillaries. Also, it has been reported that moving dry cupping therapy reduces upper shoulder and neck pain

in office workers⁶. Moreover, dry cupping therapy decreases cosmetic cellulite in women⁷ while WCT increased the sleep quality⁸. WCT and reflexology might induce a state of balance between sympathetic and parasympathetic systems and might be helpful to prevent possible cardiac arrhythmias^{9,10}.

Heavy metals have been recognized as toxins for centuries¹¹. As toxic metals are common in our environment, individuals who are occasionally exposed due to lack of sufficient knowledge of the household products are using are at risk of accidental toxicity. This includes products such as many insecticides that contain arsenic¹² and many paint products containing lead (Pb)¹³.

In a recent study, it has been reported that wet cupping blood had higher activity of myeloperoxidase, lower activity of superoxide dismutase, higher levels of malondialdehyde and nitric-oxide compared to the venous blood and suggested that WCT removes oxidants and decreases oxidative stress¹⁴.

There is no physiological mechanism or pharmacological treatment to excrete these noxious substances from blood and interstitial fluids to date except *Al-hijamah*. Besides, there is no treatment

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modality that can purify both blood and interstitial fluids from toxic metals. Since humans frequently encounter toxic metals, WCT is proposed to clear human body from toxins. Authors wanted to investigate whether WCT has an effect on the levels of heavy metals in the body. Authors looked into the levels of aluminum (Al), mercury (Hg), silver (Ag), and Pb in both venous and wet cupping blood.

Material and methods

Study design and participants

Our study population consisted of 24 healthy volunteers, 13 females and 11 males; aged 21-40 yrs (mean age 30.24±9.53 yrs). Baseline demographic and laboratory data characteristics of volunteers are shown in Table 1. Venous blood samples were collected 5 min before wet cupping employment and were placed into collection tubes specific for trace element analysis (navy blue cap tubes). Thereafter, WCT (*Al-hijamah*) was performed and wet cupping blood samples were taken from the cups and placed into navy blue cap tubes. All samples were stored as whole blood at -80 °C until analysis.

Participants who had serious conditions of the spine and spinal cord, infectious disease, malignancy, systemic or immune disorder were excluded from the study. Cupping therapy involves an invasive procedure, so participants who had blood-borne diseases or hemostatic abnormalities or took anticoagulants- anti-platelet agents were excluded. The Ethical Committee of the Faculty of Medicine of the University of Turgut Ozal approved this study. Consent forms were signed before the start of sessions in line with the principle of volunteerism.

All cupping procedures were applied by physicians certificated by the British Cupping Society and Natural Health Institute. For the cupping therapy, sterile disposable cups of 5 cm in diameter were used. Five points on the posterior neck, bilateral peri-spinal areas of the neck and thoracic spine were selected for treatment. Application areas were cleaned with antiseptic solutions. Cups were placed on these points and negative pressure was applied with the cupping pump. After 2-3 min, the cups were removed and the skin was punctured to a 2-mm depth within the cupping sites using 26-gauge disposable lancets. Vacuum pumping was applied for the 2nd time and 3 - 5 cc of blood was drained per cupping site. Application sites were then covered by using sterile pads.

Table 1- Baseline demographic and laboratory data characteristics of volunteers

Variables	Volunteers (n= 24)
Age (years)	30,24±9,5
Gender (male %)	45,8
Body mass Index (kg/m ²)	24,2 ± 3,1
Urea (mg/dl)	32 ± 8
Creatinine (mg/dl)	0.8 ± 0,5
Total cholesterol(mg/dl)	200 ± 45
LDL cholesterol (mg/dl)	115 ± 38
HDL cholesterol (mg/dl)	40 ± 12
Triglyceride (mg/dl)	150 ± 73

LDL: Low Density Lipoprotein; HDL: High Density Lipoprotein

Determination of the levels of heavy metals

Levels of Al, Pb, Ag and Hg in both blood samples (venous and wet cupping) were measured by inductively coupled plasma mass spectrometry (ICP-MS). Heavy metals (Ag, Hg, Al, Pb) were determined after wet digestion of samples using a HNO₃-H₂O₂ acid mixture (2:3 v/v) with three steps [the first step: 145 C, 75% radio frequency (RF), 5min; the second step: 180 C, 90% RF, 10 min; and the third step: 100 C, 40% RF, 10 min) in a microwave (Berg of Speedwave Microwave Digestion Equipment MWS-2). Blood metal levels were determined using an inductively coupled plasma spectrophotometer (Perkin-Elmer).

Statistical analysis

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

Results

In the present study, the levels of all the selected heavy metals were significantly higher in wet cupping blood than venous blood (Table 2 and Fig. 1).

Discussion

WCT is one of the most used alternative / complementary treatment modalities worldwide. It is believed to remove toxins but there is no scientific study investigating the relationships between heavy metals and WCT. For the first time in the literature,

Table 2- The levels of heavy metals in venous and wet cupping bloods (n= 24)

Metals	Wet cupping blood	Venous blood	P
Al ($\mu\text{g/L}$)	12.17 \pm 2.04	6.54 \pm 0.69	0.031
Pb ($\mu\text{g/dl}$)	0.96 \pm 0.13	0.11 \pm 0.01	<0.001
Hg ($\mu\text{g/L}$)	6.75 \pm 2.69	0.82 \pm 0.07	<0.001
Ag (ng/ml)	1.58 \pm 0.29	0.70 \pm 0.36	0.007

Results are expressed as mean \pm SEM

Al: Aluminum, Pb: Lead, Hg: Mercury, Ag: Silver

wet cupping blood had higher levels of toxic metals. The main findings of this study were:

- i. Al level in wet cupping blood was significantly higher than venous one (nearly twice)
- ii. Pb was higher in wet cupping blood (nine times)
- iii. Hg was higher in wet cupping blood (eight times) and
- iiii. Ag was higher in wet cupping blood (twice) compared to venous blood.

Most people are exposed to heavy metals particularly in less developed countries¹⁵. Unfortunately, confirming the diagnosis of metal toxicity is difficult because signs and symptoms are similar to those of a number of non-element-dependent diseases. Metal toxicity may occur in many ways; one of them is reacting with the sulfhydryl groups of proteins, causing a change in the protein's tertiary structure with subsequent loss of the biological activity associated with that protein¹⁶. Another mechanism for metal toxicity is that as the tertiary change occurs, some proteins become immunogenic^{16,17}. Furthermore, some metals are particularly lipophilic and avidly bind to proteins in lipid-rich tissue, such as neurons^{16,17}. Myelin is particularly susceptible to disruption by this mechanism¹⁶.

Al is one of the heavy metals whose toxicity is frequently seen in renal failure. The usual daily dietary intake of Al is 5-10 mg under normal physiologic conditions where most of it is excreted by the kidneys. Patients in renal failure lose this ability and are candidates for Al toxicity. The dialysis process is not effective at eliminating Al and can be a source of exposure. In addition, Al based-phosphate binders^{17,18} and antiacids¹⁹ some albumin products²⁰ have high Al content. When Al is not filtered by the kidney, it accumulates in blood and strongly binds to proteins and then it is distributed

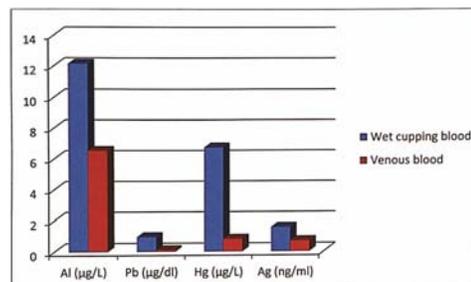


Fig.1- Levels of aluminium, lead, mercury and silver in both samples

throughout the body. Its deposition in the bone interrupts physiologic calcium exchange and causes Al-related bone disease²¹. The encephalopathy can be observed in patients undergoing prolonged hemodialysis. Al accumulates in the neurofibrillary tangle of patients with Alzheimer disease²² and may play a role in its development²³. Al accumulation in neurofibrillary tangles may be prevented by WCT in patients with renal failure. Regular application of *Al-hijamah* may reduce the risk of Al toxicity.

Pb is another metal commonly found in the environment, paint products, leaded crystals and leaded gasoline in automobiles that are important sources of Pb¹⁶. Exposure to Pb from any of these sources by ingestion, inhalation, or dermal contact has been known to cause toxicity²⁴. Absorbed Pb is rapidly incorporated into the bone and erythrocytes and is ultimately distributed among all tissues. Pb is an electropositive metal. Its high affinity for negatively charged sulfhydryl groups leads to the inhibition of sulfhydryl-dependent enzymes, such as delta-aminolevulinic acid dehydrogenase and ferrochelatase in hemesynthesis²⁴. This disruption of hemoglobin synthesis leads to the production of free erythrocyte protoporphyrins²⁷. In addition, lead inhibition of pyrimidine 5'-nucleotidase can cause the degradation of rRNA in red blood cells, which can cause basophilic stippling in a peripheral blood smear²⁴.

Lipid-dense tissues, such as the central nervous system, are particularly sensitive to organic forms of Pb. The finding that Pb contributes significantly to decreased intellectual capability in the very young is of particular concern²⁵. Some studies have revealed an inverse relationship between Pb concentrations and children's IQ even when blood Pb cons \leq 10 μg^{25} . Although chelation therapy is effective in reducing blood Pb concentrations, a study indicated that chelation therapy given to preschool children with Pb concentrations in the range of 20-44 $\mu\text{g/dl}$ showed no

beneficial effect on tests of cognition or behavior²⁶. Thus prevention is the best therapeutic option; Pb toxicity may be prevented by WCT as indicated in this study.

Hg is a heavy metal to which humans are commonly exposed. Most of this exposure comes from industry where it is used in electrolysis, in electrical switches, and as a fungicide and from its incorporation into dental amalgams¹⁵. In addition, Hg is used extensively in the pulp and paper industry as a whitener. Dietary sources also contribute to the Hg burden. For example, as a consequence of methyl mercury accumulating in the aquatic food chain²⁷, humans are exposed to mercury through the consumption of contaminated fish, shellfish and sea mammals^{28,29}.

In adults, cases of methyl mercury poisoning are characterized by focal degeneration of the neurons in some regions of the brain, such as the cerebral cortex and the cerebellum. Depending on the degree of in utero exposure, Hg toxicity may result in harmful effects ranging from death to subtle neuro-developmental delays³⁰. Consequently, pregnant women, women in the child bearing age and young children are particularly at risk. The US Food and Drug Administration (FDA) recommended avoiding eating shark, swordfish, mackerel and tilefish³¹. For preventing Hg toxicity, WCT might be advised for pregnant women and young children who are commonly exposed to Hg or to people who have amalgam fillings or to dentists who apply amalgam fillings.

Some vaccines contain Hg as the preservative thimerosal (sodium ethyl mercury thiosulfate). Concerns have also been raised about the possible relationship between mercury exposure from vaccines and autistic disorders³². In 2004, the Committee on Immunization Safety Review of the Board on Health Promotion and Disease Prevention of the Institute of Medicine reported that this hypothesis was biologically plausible, but that there was insufficient evidence to accept or reject a causal connection and recommended a comprehensive research program³³.

Ag is a rare basic element that occurs naturally in our environment as a soft metal. Humans have been exposed to silver and its compounds for centuries via the natural environment, industry, and through the use of silver-containing medication (such as nasal decongestants and silver sulfadiazine)³⁴. Ag is deposited in many organs, including the sub-epithelium of the skin and mucous membranes,

producing a syndrome called *Argyria*. It is associated with growth retardation, hemopoiesis, cardiac enlargement, degeneration of liver and destruction of renal tubules¹⁶.

How can these toxic metals removed from the body? It is thought that WCT acts via removing toxic agents from blood and interstitial fluids, although there was no scientific evidence for this theory¹.

In the literature, most of the data about WCT are from clinical trials. Only a few studies investigated the effects of WCT on biochemical parameters. Such as, Niasari *et al.* tested the effects of WCT on serum lipid concentrations. They concluded that wet cupping may be an effective method for reducing LDL cholesterol in men and consequently may have a preventive effect against atherosclerosis³⁵. Also WCT was explored to treat disorders caused by iron overloading such as hemochromatosis^{1-3,5}.

For the first time in the literature, in the present study, wet cupping blood had higher levels of toxic metals compared to venous blood. These results are in accordance with the study which recommends WCT for treatment for iron overload in beta-thalassemia major, hemochromatosis and sideroblastic anemia^{2,3,5,36}.

Conclusion

Wet cupping blood had higher levels of Al, Pb, Hg, and Ag compared to venous blood. This knowledge can be used in the clinical practice in the near future. In patients with renal failure, regular cupping application might reduce the risk of Al toxicity. Similarly, Al accumulation in neurofibrillary tangles may be prevented by WCT. Thus prevention is the best therapeutic option. Pb toxicity may be avoided by WCT. For preventing Hg toxicity, WCT might be advised for pregnant women and young children who are commonly exposed to Hg or to people who have amalgam fillings or to dentists who apply amalgam fillings. More extensive studies including more metals and with a broader study population should be carried out to further determine the biochemical content of wet cupping blood.

Limitations

Study group consisted of only adults. Therefore, whether these results apply to children is not being known. In this study, only four metals were investigated although humans are exposed tens of heavy metals every day.

Conflict of interest

None declared

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