



Review Article

Study on the Ideas and Methods of Bloodletting Therapy in the Treatment of Heat Stroke



Yining Li^{1,2}, Chengxiang Zhou^{1,2}, Tao Liu^{2,3} and Qiuling Xu^{2,3*} 

¹College of Traditional Chinese Medicine, Jinan University, Guangzhou, China; ²College of Traditional Chinese Medicine, Hainan Medical University, Haikou, China; ³Acupuncture and Moxibustion Department, The First Affiliated Hospital of Hainan Medical University, Haikou, China

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Abstract

In recent years, global warming has led to regionally high temperatures, causing lasting and extreme impacts in some areas of China. Cases of heat stroke and even fatalities have been seen in many parts of the country. Traditional Chinese medicine considers heat stroke to be a type of summerheat stroke, which belongs to the extreme heat of the Yang. Bloodletting therapy is a classical treatment in traditional Chinese medicine. Bloodletting involves puncturing certain acupoints or small epidermal veins to release a small amount of blood to dredge the channel and clear heat-fire, thus lowering a patient's body temperature. Therefore, studying bloodletting therapy as a treatment for heat stroke has significance. Here, we analyzed the core acupoint prescriptions and the application characteristics of bloodletting therapy for the treatment of heat stroke. Our review provides a basis for the selection of acupoints and treatment methods for the clinical use of bloodletting therapy for heat stroke.

Introduction

Heat stroke, commonly referred to as summerheat stroke in China, can be potentially fatal. Heat stroke is caused by imbalanced body regulation due to exposure to high temperature and humidity, resulting in a rapid rise in body temperature above 40°C with skin damage, central nervous system dysfunction, and multi-organ damage.¹ Morbidity and mortality can be greatly reduced if the body temperature is lowered in a timely manner.²

Heat stroke can be divided into exertional heat stroke and non-exertional heat stroke (also known as typical heat stroke) based on its etiology and population susceptibility.³ The main risk factors for heat stroke are climate factors, such as heat and humidity, and strenuous physical activity. Exercise-induced heat stroke is primarily due to an imbalance between heat production and heat loss caused by strenuous physical activity. Common symptoms of heat stroke include (1) elevated body temperature, which is the main manifestation of heat stroke; (2) impaired consciousness, which is the main feature of heat stroke and can involve convulsions, profound mental changes, disorientation, and even prolonged coma;⁴ and (3) other symptoms, such as headache,

shortness of breath, and muscle spasms. Heat stroke can lead to the body's inability to dissipate heat, aggravating the load on the cardiovascular system. Severe heat stroke can also cause cerebral tissue hypoxia and organ failure, increasing the risk of death. Therefore, it is necessary to timely and effectively treat patients suffering from heat stroke.⁵

Western medicine is widely used in clinical practice to treat heat stroke.⁶ The focus of treatment is rapid, effective, and continuous cooling.⁷ Upon diagnosis, a patient is transferred to a cool and ventilated position, clothing is removed to dissipate heat, and the room temperature is controlled at 18–20°C. Simultaneously, the patient is given oxygen to maintain the patency of the respiratory tract, and 1,000–2,000 mL of 5% glucose saline should be injected intravenously to protect the function of important organs and avoid respiratory and heart failure. These methods are applied to improve a patient's water and electrolyte disorders and acid-base disorders. Dexamethasone at 10–20 mg is injected to reduce cerebral edema and temperature, and diazepam can be given intravenously to treat patients with convulsions. Davis *et al.*⁸ found that even with timely and effective physical cooling, patients with severe heat stroke still have a greater probability of acute liver and kidney injury. There can also be different degrees of adverse effects. For example, while the antipyretic effect is not long lasting, patients are prone to profuse sweating. Some patients exhibit adverse reactions such as collapse, nausea and vomiting, peptic ulcer bleeding, hypothermia, and convulsions.⁹

During the treatment of heat stroke, it is important to avoid progressing to hypothermia.¹⁰ Thus, a person should not be treated with damp and cold water rinses, as mentioned by Zhang in Article 144 of the "Treatise on Cold-Induced and Miscellaneous Diseases

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*Correspondence to: Qiuling Xu, Acupuncture and Moxibustion Department, The First Affiliated Hospital of Hainan Medical University, Haikou, Hainan 570100, China, ORCID: <https://orcid.org/0000-0002-3464-482X>. Tel: +86-13215871860, E-mail: hy020439@hainmc.edu.cn

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es”, which states that “the heat cannot be removed”. It is also the theoretical basis for traditional Chinese medicine (TCM) to avoid cold compresses and cold baths for exogenous diseases. On the surface, the physical cooling method temporarily reduces the superficial heat, but in fact, the pathogenic factor is suppressed in the body and cannot be expressed. This type of treatment is prone to recurrence, as the “source of the disease” is not resolved, making one prone to relapse.¹¹

Heat stroke has been described in TCM since ancient times as being caused by the heat pathogenic factors of six excesses. The symptoms are severe, with high fever and coma, or as syndromes of heat invading pericardium, also known as “summer syncope”.¹² Summer-heat pathogenic stroke is caused by fire-heat, which is due to a Yang pathogen that is good at dispersing. When summer-heat is intense, the interstices open wide and sweat is excessively exuded, resulting in the depletion of fluid and humor and the loss of Qi, with subsequent symptoms such as shortness of breath, elevated body temperature, sweating and thirst, or even profuse sweating and sudden fainting. If summerheat enters the nutrient and blood phase pattern, symptoms such as hyperthermia and unconsciousness may occur. Heatstroke is associated with an insufficiency of middle qi and a summerheat pathogen. Summerheat can be divided into either a yin or yang summerheat pattern based on the pathogenic factor causing the heat stroke. The yang summerheat pattern is characterized by dizziness and headache, high fever and sweating, thirst and irritability, and shortness of breath. Heat stroke belongs to the yang summerheat pattern. Heat stroke is the result of extreme summer-heat and is one of the most serious types of summerheat stroke. Treatment is based on the principle of clearing pathogenic factors.¹³

In the Stone Age, people discovered that certain diseases could be treated by piercing the affected area with a sharp stone, releasing a certain amount of blood. Huangdi’s Internal Classic also recorded the content of bloodletting therapy, which indicates that bloodletting therapy can remove blood stasis and dredge collateral vessels. Plain Questions indicates that bloodletting therapy can achieve the effect of supporting and dispelling a pathogenic factor by regulating the function of meridians and viscera.¹⁴ As recorded in the Tibetan classic “Four Medical Classics”, bloodletting therapy can also be used to drain heat to treat heat illnesses.¹⁵ Bloodletting can be used to relieve fever, heat stroke, sore throat, sores on the mouth and tongue, distress, headache, asthma, epistaxis, and other heat-related symptoms. The Surgery of Traditional Chinese Medicine states that heat stroke can be treated by bloodletting and cupping.¹⁶

For patients with heat stroke, heat is an invisible pathogenic factor that must be attached to a tangible substance, which in this case is the blood.¹⁷ Acupuncture of special points can remove the heat pathogenic factor by expelling the blood, which is the rationale for using acupuncture and bloodletting therapy to reduce heat. Here, we review several ancient methods of acupuncture and bloodletting therapy.

Bloodletting by acupuncture at the EX-UE11

This procedure involves the following steps:

- Place the patient in a sitting position;
- Gently rub the patient’s finger for 1–2 minutes to congest the fingertips;
- Disinfect the EX-UE11 acupuncture point with a medical grade cotton ball lightly dipped in medical alcohol;
- Quickly pierce the acupuncture point with a disposable three-

sided needle, remove the needle, and squeeze out two to three drops of blood;

- Stop the bleeding by applying pressure with a medical grade dry cotton ball.¹⁸

EX-UE11 belongs to the extra points. These points are located at the tips of all ten fingers, at 0.1 inches (finger inches) from the free edge of the nail.¹⁹ Based on Western medicine anatomy, needle puncture, and bloodletting therapy can be transmitted to the cerebral cortex, where pain receptors can be directly stimulated. In TCM, the EX-UE11 position is where the meridian qi of the three yin and three yang meridian of the hand intersect. Acupuncture and bloodletting therapy can communicate yin and yang, pass through the meridian Qi, restore conscious resuscitation, harmonize the viscera and bowels, and purge heat that has accumulated in the viscera and bowels.²⁰ Under normal circumstances, the human body temperature is constant, subject to central autonomous thermoregulation and external auxiliary behavioral thermoregulation. Central autonomic thermoregulation is controlled by the hypothalamic thermoregulatory center, through the autonomic nervous system to regulate skin blood flow, muscle, and sweating activities. During thermohomeostasis, heat is determined by the body’s metabolic rate. In this state, heat dissipation is accomplished by sweat evaporation, convection, conduction, and radiation. Because extreme ambient temperatures exceed the core temperature of the body, convection, conduction, and radiation have a negative effect, continuing to increase the core temperature and resulting in a vicious cycle. Thus, timely cooling is particularly important.

Acupuncture treatment of fever has been extensively documented as early as the Qin and Han dynasties.²¹ The clinical observation of EX-UE11 bloodletting therapy as the main treatment of high fever has a clear and rapid effect.²² EX-UE11 bloodletting can play a role in cooling and maintaining body temperature stability, likely by dilating blood vessels to improve microcirculation, increase heat dissipation, and simultaneously maximize the role of the thermoregulatory center.²³ Studies have also demonstrated that phlebotomy therapy can significantly reduce serum C-reactive protein and reduce the body’s inflammatory response. Therefore, this unique TCM method should have a place in the clinical fever emergency system.²⁴ EX-UE11 bloodletting therapy should only be utilized for emergency symptom treatment. For heat stroke patients, doctors should first immediately remove the patient from the high heat environment, actively carry out physical cooling, and administer necessary drugs to protect the heart, brain, liver, kidney, and other organs from irreversible damage before bloodletting.

Ear-tip puncture and bloodletting therapy

This procedure involves the following steps:

- Place the patient in a sitting position;
- Disinfect the tip of the unilateral auricle at the ear tip point with a medical grade cotton ball lightly dipped in medical alcohol;
- Quickly pierce the point using a three-edged needle and then squeeze to promote natural bleeding²⁵;
- Wipe the puncture area with a clean medical grade cotton ball.

TCM believes that “fire is characterized by flaring up”. Thus, since symptoms of fire mostly manifest above the throat, blood should be released from the tip of the ear to diarrhea the fire above the thoracic diaphragm. Patients with heat stroke often have symptoms of unconsciousness. Puncturing the tip of the ear with a trigeminal needle and releasing a small amount of blood can directly attack the pathogenic factor and go straight through its chan-

nels, so that the pathogenic factor will be released with the blood and play a role in purging heat and detoxification, unblocking the meridians, and regulating the qi flow.²⁶ Xu *et al.*²⁷ reported that there are structures such as skin, subcutaneous tissue, and auricular cartilage under the ear tip point, which covers the auricular branch of the facial nerve, the anterior branch of the auriculotemporal nerve, the posterior branch of the posterior auricular artery and vein, and the superficial temporal artery. The ancient medical book clearly states that the ear tip point can be used to purge heat and stop wind, relieving spasm and pain.²⁸ It has also been reported in the literature that bloodletting therapy from the ear tip acupuncture point can calm the liver, improve eyesight, lower blood pressure, tranquilize the nerves, and detoxify, all of which can rapidly relieve symptoms of fever and convulsions. In the beginning, the released blood is purple-black in color, and after a few drops of blood are released the color gradually returns to bright red, indicating that the heat pathogenic factor has come out with the blood. As the discomfort of bloodletting therapy is mild,²⁹ ear-tip bloodletting therapy is a TCM that is commonly used in clinical practice, and has the advantages of rapid onset of action, good curative effect, simple procedure, and economically affordable.³⁰

Well point puncture and bloodletting therapy

The well point is located in the distal extremities and is the first of the five Shu acupoints. Medical practitioners of all ages have attached great importance to the application of the well points.³¹ A well point is the starting point of the twelve meridians, most of which are located next to the finger and toenails; only the PC9 acupoint is located in the center of the tip of the end of the middle finger of the hand. The KI1 point is at the bottom of the foot, specifically at the front depression of the foot when the foot is rolled. This point is located at about the first third of the intersection of the head end of the second and third toe seam line and the heel line. The lung meridian well point LU11 is located on the radial side of the end of the thumb, at 0.1 inch from the corner of the nail (the same as the body inch). The large intestine meridian well point LI1 is located on the radial side of the last knuckle of the index finger of the hand, at 0.1 inch from the corner of the nail (the same as the body inch). Bloodletting therapy at the well point may alter the blood flow shear by puncturing the capillary wall to release blood, intervening in the peripheral microcirculatory state of the extremities to regulate blood flow. The painful stimulation of the periphery acts on endothelial cells to stimulate the release of relevant hormones to trigger a chain of pathophysiological responses, which in turn affects peripheral blood flow and improves cerebral microcirculation, thereby reducing ischemic and hypoxic injury and exerting a cerebral protective effect.³² Twelve well points are mainly used to treat summerheat stroke, fever, and mental coma. Targeting the well point can open the orifice and sue the syncope, clearing the heat, and preventing transmission. In addition, the well point PC9 of the pericardium meridian, located in the center of the tip of the middle finger, is equivalent to the EX-UE11, which can clear heat, restore conscious resuscitation, and treat symptoms of the pericardium blocked by retention of heat syndrome and syncope.³³

Cupping and bloodletting therapy at the GV14

This procedure involves the following steps:

- Place the patient in a sitting position;
- Sterilize the GV14 point with a medical grade cotton ball lightly

dipped in medical alcohol;

- Puncture the point with three to five disposable trigeminal needles in a scattered manner, cupping with fire, leaving the jar for eight to ten minutes;
- Wipe the puncture area with a clean medical grade cotton ball after removing the jar;
- Sterilize with an alcoholic cotton ball.

A-B Classic of Acupuncture and Moxibustion calls GV14 “the meeting of the three yang meridians and the governor vessel”. The point is located at the top of the back, which is the yang within Yang. Blood is released at this point, dipping the governor vessel and at the same time dipping the three yang meridians of the hands and feet, which has the effect of dispelling pathogenic factors from the exterior, clearing heat, and purging fire.³⁴ Puncture cupping therapy has also been reported in ancient books.³⁵ First, piercing the skin gives an outlet for the pathogenic factor, and the simultaneous pressure of cupping eliminates the pathogenic factor from the blood, strengthening the effect of bloodletting by clearing the heat fire and decrement of fever. The use of cupping and bloodletting therapy can lead to the complete discharge of stagnant blood. In addition, fire cupping acts as a warm stimulus to the local skin, which can cause local blood vessels to dilate, promoting blood circulation and speeding up metabolism. This can accelerate the discharge of waste and toxins from the body. Some studies have found that cupping affects the local energy metabolic state and neuro-immune regulation at the acupuncture points.^{36–38} By rapidly clearing the heat of the viscera and bowels, cupping and bloodletting therapy can accelerate symptom relief, shorten the course of the disease, and achieve the effect of dispelling the pathogenic factors.³⁹ The cooling effect is also obvious.⁴⁰

Relevant clinical studies have reported that the efficiency of treatment of hyperthermia by acupuncture and bloodletting therapy at the GV14 can be as high as 98%.^{41,42} Therefore, for the treatment of heat stroke with high-temperature fever, the puncture cupping method could be a convenient and effective method for TCM first aid. However, its mechanism of action is still unclear and further research is needed. The safety and effectiveness of cupping and bloodletting therapy have not been systematically evaluated and thus cannot be implemented in clinical practice.⁴³

Precautions and contraindications

Bloodletting is contraindicated in patients with the following: deficiency of Qi and Yin, dizziness and palpitation, weakness of limbs, sweating and cold limbs, faintness, and a small number of pulses⁴⁴; severe heart, liver, kidney, hematopoietic system and other serious primary diseases, as well as those with coagulation dysfunction, severe skin infectious diseases; pregnant women, infants, and young children; and acute infectious diseases such as mental illness, edema, active tuberculosis. It is necessary to formulate measures to prevent cross-infection, such as using strict disinfection and disposable needles. Bloodletting in patients with a pale complexion, blue lips, sweating and other phenomena should be used with caution. Blood puncture cupping therapy is mainly based on puncture, and it is generally not easy to puncture the deep arteries. Acupuncture should not be too shallow or too deep. If it is too shallow, the amount of bleeding will be insufficient, which will alter the curative effects; if it is too deep, there could be excessive injury around the puncture. Continuous puncturing at the same point and induration should be avoided. Attention should be paid to the adverse effects of blood puncture on the patient, such as excessive bleeding and fainting.

Future directions

Symptoms of bloodletting treatment include fever, dizziness, headache, irritability, thirst, fatigue and weakness, chest tightness, nausea, back soreness, weight, dizziness, convulsions, red tongue, thin white or yellow greasy.⁴⁵ Phlebotomy has a long history and has been clinically proven to be effective.⁴⁶ Modern studies have confirmed that bloodletting therapy can have a positive effect on blood vessels and blood components.⁴⁷ At present, it is generally believed that blood prick is only suitable for excess pattern, and it is not advocated for deficiency pattern. The relationship between deficiency and lancet can be further explored through clinical and animal studies.

Conclusions

Bloodletting therapy can improve local microcirculatory haemodynamics for local therapeutic effects, distal therapeutic effects through central and peripheral nerve segmental connections, and systemic therapeutic effects through linkages between the motor system, the vegetative nervous system, and other systems. Therefore, bloodletting therapy not only has rapid and good effects in the treatment of acute hyperthermia in heat stroke, but also has positive healing effects in the brain and on whole body regulation.

It is an easy procedure with fast-acting, economical, and convenient outcomes, and few side effects. It is also suitable for promotion and propagation in many directions to help more people in need. However, at present, there are only clinical observations and few clinical and experimental studies, most of which only summarize the clinical experiences or treatment observations, and there are few randomized and controlled studies. To further improve the efficacy of phlebotomy in the treatment of heat stroke, more mechanistic research, standardized clinical studies, and medical statistics are needed.

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Conflict of interest

The authors have no conflict of interests related to this publication.

Author contributions

LYN and ZCX collaborated on the paper's conception and wrote the paper. XQL and LT contributed to study concept and design and critical revision of the manuscript, reviewed the paper and approved the final version of the article to be published.

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