

# Analysis on the Efficiency and Application of Glauber's Salt Based on the Clinical Case

Ma Chuanqi, Zhou Yongxue\*

Shaanxi University of Chinese Medicine, Xianyang, Shaanxi, 712046, China

\*Corresponding author

**Abstract:** Glauber's salt is an ordinary traditional Chinese medicine and it is commonly used as a laxative for a long time. The author of the article reviews and analyzes the records of glauber's salt in traditional Chinese medicine literature and modern literature by studying clinical medical records. The author analyzes the usage methods and main effects of glauber's salt in the *Treatise on Febrile Caused by Cold* and focuses on interpreting the records of glauber's salt in the *Sheng Nong's Herbal Classic* from a unique perspective. By studying ancient Chinese medical books and various modern research materials on glauber's salt and the relevant theories of modern pharmacology, the author also explores the application methods and therapeutic effects of glauber's salt in traditional Chinese medicine external treatment. From the usage methods of glauber's salt recorded by ancient and modern doctors, at the same time, it has been found that glauber's salt has a broader application space in the treatment of modern diseases, especially in the treatment of tumor diseases. Researchers still need to continuously conduct in-depth research on glauber's salt and discover new therapeutic effects.

**Keywords:** Mirabilite; Efficiency; Clinical Application

## 1. Introduction

Glauber's salt has a long history of use as a traditional Chinese medicine. Although there is no record of glauber's salt in the "Sheng Nong's herbal classic", it is recorded that mirabilite, also known as natural mirabilite, is a crude product of mirabilite before purification and preparation, and both have the same efficacy. Traditionally, glauber's salt and mirabilite were mostly used as laxatives, but referring to the records of the efficacy of s mirabilite in the "Sheng Nong's herbal classic" is far greater than that of laxatives.

## 2. Using Glauber's Salt Based on the Addition and Subtraction Method of Ji Jiao Li Huang Wan

The "Golden Chamber Synopsis"<sup>[1]</sup> records: "Symptoms and signs of abdominal fullness and distention with a parched feeling in the mouth and on the tongue indicate existence of fluid-retention in the intestines. Ji Jiao Li Huang Wan can be adopted. For those who are thirsty, half a liang of Glauber's salt is added". This article first explores the medical principles and pharmacology contained in this provision from a clinical medical case.

Patient Mr. Wang, 41 years old, initially diagnosed on April 6, 2019, complained of frequent asthma and chest tightness for over 6 years. He was diagnosed with asthma through hospitalization examination and medication treatment, but the effect was not significant. In the past year, it has gradually worsened, and in severe cases, it is difficult to breathe freely, making it difficult to continue breathing. He Carry fluticasone propionate inhaled aerosol, and in severe cases, inhaling it can alleviate the symptoms. He usually have a dry mouth and tongue, and enjoy drinking hot water more. With abdominal distension and bowel ringing, incomplete urination, sticky stools, and poor bowel movement. The tongue is fat, with large and thin yellow fur, and smooth veins. This belongs to phlegm retention disease, which is caused by obstruction of phlegm retention and obstruction of Qi circulation. Prescription: Ji Jiao Li Huang Wan and Houpu Dahuang Decoction. These are the drugs in the prescription: 15 grams of Radix Stephaniae Tetrandrae, 6 grams of Zanthoxylum Bungeanum, 30 grams of Semen Lepidii, 12 grams of Rheum Officinale, 6 grams of Glauber's salt, 30 grams of Cortex Magnoliae Officinalis, 30 grams of Fructus Aurantii Immaturus, and 15 grams of Atractylodes Macrocephala. Glauber's salt has a laxative effect. Although the patient has no symptoms of constipation, I still used 6 grams of Glauber's salt and told him that did not worry about diarrhea after

taking the medication.

On April 20, 2019, during the second visit, the patient reported a reduction in asthma and did not inhale fluticasone propionate during the period of taking traditional Chinese medicine. The urination can improve. On the second day of taking the medication, there was mild diarrhea, followed by the formation of stools and unobstructed bowel movements. Dry mouth and tongue improved, and water consumption returned to normal. The tongue is plump, the fur is thin and yellow, and the veins are smooth. He was applied an additional 14 doses above.

The prescription for the third to fifth visit of the patient remained unchanged, with 14 doses each time and no follow-up visits. When he brought his family to see a doctor at the end of March 2021, I was informed that it has been almost 2 years since he stopped taking medication. He has not had any asthma attacks, no dry mouth or tongue, and his diet, sleep, and bowel movements are normal. On November 21, 2021, a follow-up call was conducted again. Since the treatment, there has been no discomfort in the body and life has been normal.

### **3. Analyzing the efficacy of Glauber's salt from the "Sheng Nong's herbal classic" and other herbal books**

According to the textbook "Traditional Chinese Medicine"<sup>[2]</sup>, the efficacy of Glauber's salt is "to relieve diarrhea, moisten dryness, soften hardness, clear fire, and reduce swelling". Its pharmacological effect is: "The main component of mirabilite is hydrated sodium sulfate, which forms a hypertonic solution in the intestine, prevents water absorption, increases intestinal volume, causes mechanical stimulation, and promotes intestinal peristalsis leading to diarrhea". But the patient only had one episode of diarrhea during medication, and then the stool went from unformed to formed. At the same time, the situation of poor urination and residual urine has also improved, which seems to be contrary to the textbook. Looking at the "Sheng Nong's herbal classic", there is no Glauber's salt in the book, but it records the natural mirabilite, which is what we now refer to as natural Glauber's salt. In the "Sheng Nong's Herbal Classic"<sup>[3]</sup>, it is recorded that it can expel accumulation of pathogenic factors in the six Fu-organs and fixed lump. In addition, there is "to take refined it will relax the body like immortals". Moreover, in the "Sheng Nong's herbal classic" it is classified as a "the first grade", at least indicating that mirabilite is not a poison. After the "Sheng Nong's Herbal Classic", in the "Annotations to the Materia Medica Classic"<sup>[4]</sup>, written by Tao Hongjing during the Qi and Liang period of the Southern Dynasties, the records about Glauber's salt became more abundant. Among them, it is mentioned that "unblocking meridians, promoting bowel movements and menstruation", indicating that Glauber's salt can enter the bloodstream and urinary system. In the "Record of Famous Doctors"<sup>[5]</sup>, it is recorded that Glauber's salt is as white as silver when refined, capable of being cold, hot, slippery, astringent, spicy, bitter, salty, and sour. For this passage, Zou Shu of the Qing Dynasty had a large section in his book "Ben Jing Shu Zheng", which briefly summarized that the Glauber's salt is not focused on cold or hot, slippery or astringent, but on restoring the normal distribution of body fluids and normal metabolism of the human body. Therefore, it is called "Bring the old to the new"<sup>[5]</sup>. If the balance of the human body is restored, then what was originally cold will no longer be cold, and obviously the Glauber's salt is hot, and vice versa. For example, Glauber's salt cannot directly treat thirst, while the addition of mirabilite to Ji Jiao Li Huang Wan to treat thirst is due to the mutual bonding between body fluid and lesions, causing the body's fluid distribution to lose balance and cannot be carried by the mouth for thirst. By using Glauber's salt to eliminate the lesion and allowing the body fluid to function normally, thirst is cured. Glauber's salt cannot treat diarrhea, but Zhang Zhongjing added Glauber's salt to Xiao Chaihu Decoction to treat diarrhea. This diarrhea was caused by a doctor's mistake. Diarrhea is caused by the accumulation of heat in the intestines, and body fluids cannot be distributed normally. By using Glauber's salt to remove the accumulation, body fluids can be distributed normally, and abdominal diarrhea is cured.

### **4. Application of Glauber's Salt in Chaihu Plus Glauber's Salt Decoction in "Treatise on Febrile Caused by Cold"**

Based on the above analysis, I will continue to discuss the medical principles and pharmacology contained in Article 104 of "Treatise on Febrile Caused by Cold"<sup>[6]</sup>: "Febrile disease caused by cold, the syndrome lasts thirteen days. The patient vomits and is nauseous and feels oppressed in the chest. He is having a tide-fever at about three to five in the afternoon and diarrhea. This is a Xiao Chaihu decoction syndrome, which should not have diarrhea if Xiao Chaihu decoction has been adopted. The patient must

have been given drastic pills, which is a mistake. Tide-fever indicates an excessive syndrome. First Xiao Chaihu decoction should be given to dispel the exterior syndrome. Then Chaihu Plus Glauber's Salt Decoction should be adopted as the main curative". This article discusses the method of treating diseases from the outside to the inside. After taking Xiao Chaihu Decoction to treat external pathogens, add Glauber's salt to treat internal factors. According to Article 104, what Zhang Zhongjing is talking about here is no longer a simple disease, but a serious disease similar to current liver cancer or cancer liver metastasis. Firstly, "Febrile disease caused by cold, the syndrome lasts thirteen days" indicates that the disease has been ongoing for some time and has not improved after treatment, indicating that it is not a simple disease in the general sense, but rather a relatively difficult to treat disease. The term "the patient vomits and is nauseous and feels oppressed in the chest" refers to the enlargement of the lesion from the chest to the entire chest and abdominal cavity. It is not the previous silent lack of appetite or ordinary vomiting, but rather more severe vomiting. Zhang Zhongjing used Xiao Chaihu Decoction to treat this disease. Considering the damage to gastric Qi and the inability of the stomach to withstand too much medication, he reduced the dosage of Xiao Chaihu Decoction and only used one-third of its weight to continue treatment. At the same time, Xiao Chaihu Decoction contains ginseng, licorice, ginger, and jujube, which can dispel morbid Qi while also supporting the body's Qi and protecting the spleen and stomach of the middle energizer. On the other hand, he used Glauber's salt to clear heat and cause diarrhoea. The description of "the patient vomits and is nauseous and feels oppressed in the chest" in this article is very in line with the condition of patients with liver cancer and gallbladder cancer, especially the symptoms manifested after the occurrence of intestinal obstruction, pleural effusion and abdominal effusion.

## 5. The application of Glauber's salt in modern diseases

Almost every sentence in the "Sheng Nong's Herbal Classic" [3] that records Glauber's salt can correspond to the modern meaning of tumor and cancer disease. The first sentence "to treat all diseases" refers to the wide range of treatment with Glauber's salt. Why does it record the efficacy of various diseases? Modern Chinese medicine believes that excessive diet is one of the triggering factors for many diseases. The idea that excessive diet can make people sick has been around for a long time. As early as the "Yellow Emperor's Inner Canon" [7], there was a record of "the transformation of sorghum, the growth of large grains", which set the rules for later medical practitioners to treat various diseases caused by excessive diet. In the Han Dynasty, agricultural production was still very backward, grain production was not high, and the people had not yet solved the problem of having enough to eat. It is always good to eat more, but Zhang Zhongjing specifically mentioned in Article 398 of "Treatise on Febrile Caused by Cold" [6]: "When the pulse returns to normal, the patient still feels slightly restless at dusk. This is caused by too much intake of food right after the recovery of a serious case. The deficient Stomach Vital Energy cannot digest so much food and restlessness ensues. Feeding the patient with limited diet will be a good remedy." When Zhang Zhongjing wrote "Treatise on Febrile Caused by Cold", he was meticulous in every aspect. Here, he still had to spend a lot of time explaining that after recovering from illness excessive diet caused the disease to recur again, and analyzing the pathogenesis and pathology of the disease. Finally, he gave the treatment method of "Feeding the patient with limited diet will be a good remedy." The theory that excessive diet can lead to illness gradually matured with the continuous development of medicine and was valued by the Yuan Dynasty physician Zhu Danxi, who extensively discussed it in his medical works. Zhu Danxi proposed that "phlegm carries stasis blood, resulting in the formation of cysts" [8], pioneering a method for treating the accumulation of symptoms and masses. The theory that excessive diet can lead to illness gradually matured with the continuous development of medicine and was valued by the Yuan Dynasty physician Zhu Danxi, who extensively discussed it in his medical works. In the "Danxi Heart Technique" [8], it is recorded that "Pikui refers to phlegm and drink in the middle, food accumulation on the right, and blood clots on the left. Qi cannot be made into blocks to gather, and tangible things can be formed in blocks. Phlegm and food accumulation result in dead blood." The book discusses in detail that food accumulation, phlegm and blood stasis are the material basis for the formation of lumps.

In summary, excessive diet is a widespread pathogenic factor, and drugs that can treat excessive diet also have the effect of treating many diseases. The role of Glauber's salt in clearing the intestines and softening and dispersing nodules, and conquering and eliminating accumulation is well known. Therefore, the ancient people's assertion that Glauber's salt "to treat all diseases" [3] does not seem to be an exaggeration, but rather deserves its name. It is recorded that Glauber's salt can eliminate Evil-Qi caused by cold and heat, expel accumulation of pathogenic factors in the six Fu-organs and

fixed lump, and resolve seventy-two kinds of stones in the body.<sup>[3]</sup> These are almost exclusively designed for tumor diseases. In the ancient names of diseases, many diseases with the words “stone, rock, gall, tumor” correspond to our current tumor diseases, such as breast rock corresponds to the current breast cancer, stone gall corresponds to thyroid cancer, stone mass corresponds to gynecological tumors, stone water corresponds to ascites, especially ascites in the middle and late stages of liver cancer, and so on. The concept that it can resolve seventy-two kinds of stones in the body reveals that glauber's salt can be used for the treatment of tumor diseases.

## 6. Application of Glauber's Salt in External Treatment of Traditional Chinese Medicine

Traditional Chinese medicine external treatment has a long history, and ancient people discover that the Chinese medicine external application has the effects of sealing wounds, preventing infections, and relieving pain. Glauber's salt is a commonly used topical Chinese medicine. Due to its low price, simple usage, and good effects, pharmaceutical scholars have been increasing their research on Glauber's salt year by year. Glauber's salt has a wide range of applications, which can be used for external use alone, in combination with other drugs, or in combination with physical therapy. The use of glauber's salt external application has a significant effect and is often used for heat syndrome, playing a role in clearing heat, reducing swelling, softening hardness, and dispersing nodules. Glauber's salt alone can have the effects of clearing heat and detoxifying, anti-inflammatory and swelling reducing, and treating abdominal fluid accumulation. There are two ways to use glauber's salt in combination with other drugs. One is to use glauber's salt in combination with garlic, glauber's salt with borneol, glauber's salt external application with infrared radiation, and glauber's salt with fumigation drugs. Among these treatment methods, glauber's salt is a drug used for treatment, while garlic, borneol and infrared act as transdermal absorption enhancers to promote glauber's salt penetration through the skin for further good effects. Another method is to use glauber's salt in combination with rhubarb, glauber's salt with safflower, glauber's salt with moxibustion, glauber's salt with acupuncture, etc. They have a synergistic effect, increasing anti-inflammatory and reducing swelling effects. The characteristics of external application therapy with glauber's salt are convenient, simplicity, ease of operation, low cost, significant effects, and low side effects. It is an effective external treatment method that can quickly alleviate patient pain and improve symptoms. At the same time, it can also improve the quality of life of patients and increase their satisfaction.

The main components of glauber's salt include sodium sulfate, sodium chloride, magnesium sulfate, calcium sulfate, etc. Glauber's salt can be used topically to clear heat, detoxify, disperse nodules, and reduce swelling<sup>[9]</sup>. A case report by Luo Xiaoyan<sup>[10]</sup> showed that the application of glauber's salt in the treatment of a case of extravasation of mannitol intravenous infusion was more effective than the application of magnesium sulfate, and the advantages of using glauber's salt in the treatment were simple method, easy operation, and low cost. Similar studies have also shown that Chai Xuejun<sup>[11]</sup> cared for 159 patients with lower limb venous thrombosis and limb swelling. She put one kilogram of glauber's salt into a cotton bag and applied it externally to the patient's lower limbs, changing it once a day for 5 to 10 consecutive days. Overall, the treatment effect is satisfactory. In addition, there have been successful studies on the application of glauber's salt to treat lower limb swelling in peritoneal dialysis patients<sup>[12]</sup>. Glauber's salt has the ability to improve local blood circulation, dilate blood vessels, accelerate blood flow, and does not affect renal function. It is an effective method to reduce swelling in the lower limb. Zhao Bing's research report<sup>[13]</sup> pointed out that applying glauber's salt to the navel area for the treatment of liver cancer ascites is quick and effective. Wen Ya<sup>[14]</sup> treated 120 patients with chronic heart failure and scrotal edema. She randomly divided the patients into an observation group and a control group. The control group was given magnesium sulfate wet compress, while the observation group was given glauber's salt external application. The results showed that the observation group was better than the control group in terms of total effective rate, swelling reduction degree, comfort, etc. The effect was satisfactory and easily accepted by the patients. Modern pharmacological studies have shown that the external application of glauber's salt not only accelerates lymphatic circulation, but also enhances the phagocytic function of reticuloendothelial cells, reduces leukocyte infiltration, and alleviates inflammatory cytokine responses. Glauber's salt has good antibacterial and anti-inflammatory effects<sup>[15]</sup>. Glauber's salt external application can effectively treat pediatric lymphadenitis<sup>[16]</sup>. There are successful studies on the treatment of iridocyclitis with glauber's salt in the literature<sup>[17]</sup>. Li Cuiyu<sup>[18]</sup> explored the effect of external application of glauber's salt in the treatment of gouty arthritis. Her conclusion is that the external application of glauber's salt can improve the symptoms of redness, swelling, fever, and ventilation in patients, and improve their quality of life. Wang Yun<sup>[19]</sup> reported a case of subcutaneous tunnel infection in peritoneal dialysis treated with

external application of glauber's salt twice a day, combined with anti-inflammatory drugs, analgesic drugs, nutritional support, and other treatments. After 15 days of hospitalization, the infection was controlled and the condition remained stable. Two weeks of follow-up after discharge, the patient's inflammatory mass disappeared.

## 7. Summary

By synthesizing the records of glauber's salt in ancient Chinese medicine books and modern literature, it can be concluded that on the one hand, glauber's salt has the functions of diarrhea, defecation, moistening dryness, softening firmness, clearing fire, and reducing swelling in traditional medicine; External treatment for breast carbuncle and hemorrhoid swelling and pain<sup>[20]</sup>. On the one hand, in modern clinical applications, it has also been found that: (1) in the treatment of functional constipation, glauber's salt can regulate gastrointestinal motility and improve intestinal fluid metabolism<sup>[21]</sup>. (2) In the treatment of acute severe pancreatitis, clinical trials have verified that glauber's salt has the effects of anti-inflammatory and analgesic effects, preventing infection, absorbing peritoneal exudate, promoting abscess absorption, and promoting and restoring gastrointestinal function<sup>[22]</sup>. (3) In the external application of antibacterial and anti-inflammatory drugs, glauber's salt has a good anti-inflammatory effect. Its mechanism of action is related to the fact that external application of glauber's salt can accelerate lymphatic circulation, enhance the phagocytic function of reticuloendothelial cells, reduce local white blood cell infiltration, and alleviate inflammatory reactions<sup>[23]</sup>. (4) In the treatment of tumor diseases, research<sup>[24]</sup> indicates that mirabilite can reduce the rates of carcinogens promoting and inducing cancer.

## References

- [1] Zhang Zhongjing. *Golden Chamber Synopsis* [M]. Beijing: People's Health Publishing House, 2005: 47. (in Chinese)
- [2] Zhong Gansheng *Traditional Chinese Medicine* [M]. Beijing: China Traditional Chinese Medicine Press, 2012: 147-148. (in Chinese)
- [3] Sun Xingyan. *Revised Sheng Nong's Herbal Classic* [M]. Taiyuan: Shanxi Science and Technology Press, 2017: 12. (in Chinese)
- [4] Tao Hongjing. *Annotations to the Materia Medica Classic* [M]. Beijing: People's Health Publishing House, 1994:136. (in Chinese)
- [5] Tao Hongjing. *Record of Famous Doctors* [M]. Shang Zhijun, Compilation. Beijing: China Traditional Chinese Medicine Press, 2013:6. (in Chinese)
- [6] Zhang Zhongjing. *Treatise on Febrile Caused by Cold* [M]. Beijing: People's Health Publishing House, 2005: 47-48,107. (in Chinese)
- [7] Zhang Dengben, Sun Lijun. *Complete annotation and translation of the Yellow Emperor's Inner Canon* [M]. Beijing: New World Publishing House, 2010:14. (in Chinese)
- [8] Zhu Danxi. *Danxi Heart Technique* [M]. Beijing: China Medical Science and Technology Press, 2012: 69, 189-190. (in Chinese)
- [9] Zhang Min. *Observation on the effect of external application of mirabilite in the treatment of peripheral venous hypernutrition induced phlebitis* [J]. *Nursing and Rehabilitation*, 2011, 10 (9): 800-801. (in Chinese)
- [10] Luo Xiaoyan, Chen Benhui. *Nursing care of a case of mannitol extravasation treated with external application of mirabilite* [J]. *Nursing Practice and Research*, 2013, 10 (3): 153. (in Chinese)
- [11] Chai Xuejun, Shi Qing. *Nursing experience of external application of mirabilite in the treatment of lower limb edema caused by venous thrombosis* [J]. *Inner Mongolia Traditional Chinese Medicine*, 2011, 30 (13). (in Chinese)
- [12] Huang Liuyan, Shen Qiyun, Li Limei. *Observation of the effect of external application of mirabilite on improving lower limb edema in peritoneal dialysis patients* [J]. *Journal of Nursing*, 2012, 27 (3): 25-26. (in Chinese)
- [13] Zhao Bing, Liu Yingchun. *Observation on the therapeutic effect of external application of mirabilite in the treatment of liver cancer ascites* [J]. *Journal of Practical Traditional Chinese Medicine*, 2014, 30 (4): 330. (in Chinese)
- [14] Wen Ya, Xu Ying, You Guiying. *Evaluation of the effects of external application of mirabilite and wet application of magnesium sulfate on patients with chronic heart failure and scrotal edema* [J]. *Journal of Chengdu Medical College*, 2014, 9 (6): 725-727. (in Chinese)
- [15] Liu Shaoyan, Bai Ming, Yang Yalei, et al. *Study on the anti-inflammatory effect of external use of*

- mirabilite [J]. Chinese Journal of Traditional Chinese Medicine, 2012, 27 (2): 312. (in Chinese)*
- [16] Du Xianshi. Treatment of 59 cases of pediatric submandibular suppurative lymphadenitis with puncture aspiration and external application of mirabilite [J]. *Chinese and Foreign Health Digest (Clinical Medicine Edition), 2008, 5 (6): 79. (in Chinese)*
- [17] Wang Shibiao, He Jihong. External treatment of acute iridocyclitis with mirabilite [J]. *Chinese Journal of Traditional Chinese Medicine, 2011, 3 (4): 4. (in Chinese)*
- [18] Li Cuiyu, Duan Weifeng. Observation and nursing of gout joint symptoms treated with external application of mirabilite [J]. *Contemporary Chinese Medicine, 2010, 17 (16): 105. (in Chinese)*
- [19] Wang Yun, Wang Yun. Nursing care of subcutaneous tunnel infection in peritoneal dialysis patients treated with external application of mirabilite [J]. *Chinese Journal of Nursing, 2013, 48 (11): 1015-1016. (in Chinese)*
- [20] National Pharmacopoeia Commission. *Pharmacopoeia of the People's Republic of China. One part [M]. Beijing: China Medical Science and Technology Press, 2010: 118-119. (in Chinese)*
- [21] Zhou Yongxue, Wang Yujin, Yan Shuguang, et al. The effect of Nifen Tongjie Formula on the VIP-cAMP-PKA-AQP3 signaling pathway in colon tissue of functional constipation rats [J]. *Chinese Journal of Experimental Prescriptions, 2016, 22 (24): 99-104. (in Chinese)*
- [22] Huang Xiuhai, Liu Yuehui, Zhang Dengke, et al. External application of borneol and mirabilite in the treatment of 24 cases of acute severe pancreatitis [J]. *Chinese Journal of Integrated Traditional and Western Medicine, 2001 (05): 390-391. (in Chinese)*
- [23] Liu Shaoyan, Bai Ming, Yang Yalei, et al. Study on the anti-inflammatory effect of external use of mirabilite [J]. *Chinese Journal of Traditional Chinese Medicine, 2012, 27 (02): 312-315. (in Chinese)*
- [24] Zhou Limiao, Ye Hong, Chen Lingling. Dynamic analysis of the use of traditional Chinese medicine in the oncology department of a Class A tertiary hospital [J]. *Journal of Traditional Chinese Medicine Management, 2021, 29 (05): 86-88. (in Chinese)*