REVIEW ARTICLE

Safedah (Lead carbonate): A comprehensive review on a mineral origin Unani drug

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Abstract

The present discussion examines lead carbonate, a medicinal substance derived from minerals that have been extensively used in the Unani System of Medicine as Safedah Kashghari. The study explores the origins, chemical properties, description, preparation methods, temperament, and actions of lead carbonate as documented in both Unani literature and modern scientific research. Multiple sources, ranging from ancient Unani texts to recent scientific papers are referenced to support the information presented in the study. In addition, a table is provided to outline the actions of lead carbonate in both the Unani System of Medicine and English terminology. This comprehensive review concludes that when used in the prescribed dosage, lead carbonate is a valuable natural remedy.

Key word: *Isfidaj*, lead carbonate, *Marham Kafoori*, *Marham Siyah*, mineral drug, *Safedah Kashghari*, Unani system of medicine

INTRODUCTION

Lead carbonate, known as Safedah Kashgari in the Unani System of Medicine, is a well-established mineral-based drug that has been used for many years. It is obtained by burning lead (seesa), zinc (jast), and tin (Raang/Qalai/stannum). Depending on the type of metal used, Safedah can be Safedah Arzer, Safedah Roami, or Safedah Kashghari. Most of the Safedah was imported from Kashghar City in Southern Xinjiang, China, which is why it was named Safedah Kashghari and considered of the best quality. In India, Safedah derived from burning zinc is commonly available and known as "Basic Lead Carbonate."[1-4]

Conventionally, lead carbonate has been used in various traditional medicines worldwide, particularly in India and Nigeria. However, recent research has shown that these lead-based traditional medicines can be highly toxic due to their elevated lead content.[5,6]

While proponents argue that extensive preparation methods for these traditional medicines alter the toxic nature of lead and render it non-toxic or even therapeutic, both an experimental study on rats and clinical trials have confirmed that the Ayurvedic lead-containing preparation called "sastiputanagabhasma" is non-toxic when administered below 6 mg/100 g body weight.[7]

VERNACULAR NAMES: [1,2,8-17]

Scientific	Lead Carbonate or Carbonate of lead
Latin	Plumbi carbonas and Cerussa
English	White lead, Flake white, and Basic Lead carbonate
Arabic	*Isfaydab and Isfidaj*
Persian	*Safedab, Sapeda, and Arzir*
Bangla	*Safeda*
Hindi	*Safaydah*
Urdu	*Safedah*

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CHEMICAL PROPERTIES[18]

Molecular formula	$(PbCO_3)_2$
Molar mass	267.21 g/mol
Melting Point	315°C
Insoluble	In alcohol and Ammonia
Soluble	In acid and alkali
Flash point	Non-Inflammable
Chemical constituents	Lead, Carbonic acid, Stannum, Zinc

MAHIYAT (DESCRIPTION IN UNANI LITERATURE)[19-21]

The given text describes a white, water-insoluble soft, and heavy powder. It is odorless, dull, slightly bitter, and tasteless. Roman and Greek women are particularly fond of using it for cosmetic purposes.

PREPARATION OF *SAFEDAH KASHGHARI*

In Unani literature, detailed descriptions are given of several methods for preparing Safeda Kashghari from Qala'ai, seesa, and jast. Two methods, combustion (burning) and Ta'afien (Putrefaction) used for its preparation.

Safedah Preparation by Burning

a. From *Jast* (Zinc)
   Place small zinc pieces into an iron pan and ignite the flame. Stir the mixture using an iron rod. While it burns, sprinkle a layer of powdered Arsenic over it. Once burned, the zinc turns white, resembling cotton
b. From *Raang and Seesa*
   In a clay pot, combine the small pieces of the aforementioned metals and stir them with an iron spoon until they resemble ash. Proceed to place the mixture over low heat and allow it to burn until it turns completely white. If it does not achieve this color, sprinkle it for one week and it will eventually become white.

Safedah Preparation by *Ta'afien* (Puterification)

A few methods have been listed here,

To produce a new version of the given text while maintaining the original meaning and context, the following approach can be taken:

i. Mash raang and seesa pieces with grapes and branches, and place them in a damp location. Over time, this mixture will change to a white color
ii. Place Raang and seesa in a small permeable container and suspend it inside a larger container filled with vinegar. These metals turn white due to the vapours emitted by the vinegar.

In the present times, lead carbonate can synthesized using any of the following techniques:

- Subjecting a cold and diluted solution of lead (II) acetate to carbon dioxide
- Mixing a suspension of a "lead salt" that is more soluble than carbonate with "ammonium carbonate" at a low temperature.

Mizāj (Temperament)[22]

- Barid (Cold) 3rd degree and Yabis (Dry) 2nd degree.
- Barid Yabis (Cold and Dry) 2nd degree.

PHARMACOKINETICS OF LEAD IN HUMAN

Lead is found in at least 45 human tissues and vital organs. It enters the body through three pathways: the mouth, nose, and skin contact. The absorption of lead through the gastrointestinal tract depends on various factors, including the physical form of lead, particle size, and the individual's nutritional status. However, elemental and inorganic white lead, which is a lead carbonate compound, cannot be absorbed through intact skin. Once absorbed, lead is primarily distributed in three components: the blood, soft tissues such as the liver, kidneys, lungs, brain, spleen, muscles, and heart, and mineralizing tissues like bones and teeth. The skeleton contains approximately 90% of the total body load of lead. Macrophages are responsible for eliminating 90% of the absorbed lead. Lead is excreted from the body through urine, feces, sweat, hair, milk, and nails, accounting for approximately 80–90% of the total excretion.[23]

Expiry

3–6 years.

Dosage (*Miqdar-e-khoorak*)

- Externally as per need[24]
- Orally not recommended.

Af'al (Action)[1-3,8-17]

S. No.	Actions in USM	English terminology	Description
1	*Munbit-i-laham*	Tissue regenerator	A substance that promotes the growth of new tissue at a wound site. They stimulate the natural healing process aiding in the formation of new flesh and the repair of damaged tissue
2	*Musakkin*	Sedative	Relieves pain when applied locally
3	*Mujaffif*	Desiccative	Reduce moisture from the surface and dry out the humid area
4	*Mubarrid*	Refrigerant	When applied locally on a warm or inflamed area provides a cooling effect
5	*Mugharri*	Glutinous	Have sticky or adhesive action
6	*Habis-ud-dam*	Styptic/Haemostatic	Used to stop bleeding, particularly from small cuts or wounds
7	*Qabiz*	Astringent	Capable of producing contraction or shrinkage of tissues when applied tropically on skin or mucosa.
8	*Akkal*	Corrosive	Has the property of causing damage or deterioration of unhealthy tissues
9	*Mudammil-e-qurooh*	*Cicatrizant*	Promotes the healing of wounds, injuries, or scars. Aids in the process of tissue repair and regeneration, helps wounds to close and form scar tissue.
10	*Qa'ataesailan-i-haiz*	Anti-menorrhagic	Used to reduce or stop excessive menstrual bleeding
11	*Ma'anae Hamal*	Contraceptive	Used to prevent unwanted pregnancy
12	*Dafaedard-e-chashm*	Occular pain relief	Help to alleviate discomfort or pain in the eyes
13	*Mulattif*	Demulcent	Has soothing and protective properties if applied locally to mucous membranes or irritated surfaces of the body. Mostly used to relieve irritation and inflammation of the throat and gastrointestinal tract by forming a protective coating that reduces discomfort and promotes healing.

Lethal Dose

- 3–17.5 *Maasha* (if taken orally).[21]

Uses *(Iste'mal)*:[1,3,8,9,12,14,19-21]

Disease name	Method of use
Anal fissure (*Shuqaq-al-Maqa'ad*)	Mix with egg white and apply locally
Wound and Abrasion	As ointment used locally
Dry and Wet itching	Used alone or with other drugs
Eye diseases such as eye pain, *Aashob-e-Chashm* (Conjunctivitis), *Busoor-e-Qarnia* (Corneal verrucae), and *Qurooh-e-Chashm* (Corneal Ulcers)	With other medicines, *Safedah Maghsool* alone or in the form of Shiyaaf (Suppository)
Burn *(Sokhtagi-aatish)*	A cloth dipped in a mixture of Lead carbonate and *Roghan-e-Gul* (Rosa oil) or Egg white was placed over the affected part.
Gonorrhoea (*Sozaak/ Hirkat-ul-bol*), *Qurooh-e-masana* (Bladder Ulcers), *Qurooh-e-bieni* and stops burning micturation (*Sozish-e-Bol*)-*aatish*)	With some cold medicines such as goat milk it douching in the bladder
epistaxis (*Ruaf*)	Locally in the nasal cavity
Intestinal ulcer (*Qurooh-am'a*)	used as an enema with other drugs
Erysipelas (*Surkhbada*) and erythema	
Boils, inflamed swelling, hemorrhage, and burn.	With *Mako* leaves (*Solanumnigrum L.*) or other medicine

Adverse Effect (*Muzir*):[1-3,8-17]

- *Maanaehamal* (Contraceptive)
- Causes*khunnaq* (Diphtheria)
- *Muzif-i-dimagh* (Causes weakness of brain).[18]

Musleh (Correctives):[1-3,8-17]

- *Anisoon* (*Pimpinella anisum L.*), *Baadiyaan* (*Illicium anisatum* Linn) and Honey

- Emesis with the help of decoction of Figure (*Anjeer*), *Khubbazi* (*Malva sylvestris*), and Honey
- *Usaarah Afsanteen* (*Artemisia absinthium* Linn.) as laxative
- *Maa-ul-asl*as diuretic[21]

Badal (Substitutes)

- Burnt (Zinc) *Jast*, (Lead) *Seesa,* and *Murdar Sang*.[24]

Murakkabat (Important formulations):[17,18]

1. *Shiyaaf-e-abyaz*
2. *Shiyaaf-e-ikhzar*
3. *Marham-e-Kafoori*
4. *Marham-e-Siyah*
5. *Zimaad-e-bawaseer*.

LEAD POISONING

Lead poisoning is the most prevalent disease of environmental origin in the United States today. Inhalation of lead in the workplace is the primary cause of adult lead poisoning. Pediatric lead poisoning, on the other hand, is predominantly caused by the ingestion of lead from various environmental sources such as paint chips, dust, soil, drinking water, ceramics, and medications. Lead is toxic to several organ systems, including developing erythrocytes, kidneys, and the nervous system. The central nervous system is particularly susceptible to lead toxicity, leading to delayed development, decreased intelligence, and altered behavior. This effect has been convincingly demonstrated in young children with blood lead levels ranging from 10 to 20 µg/dL. The Centre for Disease Control and Prevention recommends considering a blood lead level equal to or higher than 10 µg/dL as evidence of increased lead absorption, a recommendation supported by the National Academy of Sciences.[25]

CONCLUSION

After examining the classical Unani literature, we have come across some unusual medicinal applications of Safedah in skin ailments, eye issues, bladder problems, and certain surgical conditions. The Unani scholars were aware of the toxicity of ingesting Safedah orally, so they mostly recommended its external use. To minimize the toxic effects, it is advised to wash and burn Lead before utilizing it for medicinal purposes. To enhance its compatibility for skin diseases, Safedah should be used in gel form.

Lead is categorized as one of the heavy metals, and excessive consumption can result in lead toxicity, also known as plumbism. It is essential for all food items, including water, to adhere to the prescribed limits for heavy metals. Medicinal products should not contain more than 10 parts per million (ppm) of lead.[27-30] Dr. Preeti Mangala conducted a study, which revealed that certain Ayurvedic and homeopathy medicines contained high levels of lead, ranging from 20 ppm to 3000 ppm and 10 ppm to 80 ppm, respectively.[31] It is important to conduct similar studies to determine the lead content in Unani compound medicine to prevent lead toxicity.

This review will assist researchers in conducting further studies on the toxic effects and other aspects related to Safedah. It concludes that when used in the prescribed dosage, lead can be beneficial as a medicine, but excessive use can lead to its toxic effects.

AUTHORS' CONTRIBUTIONS

All authors contributed to data analysis, drafting, vising of the article, and agreed to be responsible for all aspects of this work.

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