STM JOURNALS

Journal of
AYUSH: Ayurveda, Yoga, Unani, Siddha and Homeopathy

ISSN: 2278-2214 (Online)
ISSN: 2321-6484 (Print)
Volume 13, Issue 1, 2024
January–April
DOI (Journal): 10.37591/JoAYUSH

http://medicaljournals.stmjournals.in/index.php/JoAYUSH/index

Review JoAYUSH

Examining the Medicinal Role of Alum in *Unani* Medicine: An Overview of Traditional Uses and Scientific Investigations

Asma RA Chaudhry[1,*], Asma Malik Azmi[2], Asif Ali Chaudhary[3], Fouzia Farooqui[4], S. Saleemunnisa Yousuf[5]

Abstract

Alum, also known as Shibb-e-Yamani, is a crystalline substance devoid of color, transparent, and lacking any scent. It possesses a sweetish astringent flavor and is categorized as a hydrated double salt. Typically, it comprises of aluminum sulfate, water molecules as part of its structure, and the sulfate of another element. Frequently, it is found mixed with impurities. To render it suitable for medicinal usage, a process involves dissolving it in boiling water, straining the solution, and then evaporating it to procure crystals that are preserved for various applications. This versatile compound holds immense significance across numerous industries. It plays a pivotal role in producing medicines, textiles, sugar, paper, paints, matches, and deodorants. Moreover, it finds its way into baking powder, fire extinguishers, dyeing as a binder, water purification as a flocculating agent, and paper waterproofing. Its properties are vast, including astringent, hemostatic, caustic, styptic, antispasmodic, and antiseptic attributes. Its action involves reducing exhalations, organic secretions, and blood supply to a specific area by constricting small vessels and fibers. In the realm of Unani medicine, alum stands as a mineral-derived remedy. Its applications encompass a wide array of therapeutic uses due to its astringent, analgesic, hemostatic, desiccative, and expulsive properties concerning the placenta and fetus. It further showcases antipyretic, detergent, corrosive, expectorant, emetic, and irritant characteristics. While various in vitro, in vivo, and clinical studies have explored aspects like antibacterial traits, hemostatic qualities, wound healing potential, anti-obesity effects, and larvicidal activities, these investigations remain insufficient in fully encapsulating the extensive therapeutic indications highlighted in Unani literature. The present review endeavors to delve into alum's medicinal potential within Unani medicine and underscore the necessity for further research to uncover its unexplored properties.

***Author for Correspondence**
Asma RA Chaudhry
E-mail: chaudhryasma05@gmail.com

[1]Professor, Department of Ilmul Qabalat wa Amraz e Niswan, ZVM Unani Medical College and Hospital, Pune, Maharashtra, India
[2]Professor, Department of Kulliyat, ZVM Unani Medical College and Hospital, Pune, Maharashtra, India
[3]Assistant Professor, Department of Moalijat, Anjuman-I-Islam's Dr M.I.J.T Tibbia Unani Medical College and Haji A.R Kalsekar Tibbia Hospital, Mumbai, Maharashtra, India
[4]Associate Professor, Department of Ilaj bit tadbeer, ZVM Unani Medical College and Hospital, Pune, Maharashtra, India
[5]Assistant Professor, Department of Tahaffuzi wa Samaji Tib, ZVM Unani Medical College and Hospital, Pune, Maharashtra, India

Received Date: October 17, 2023
Accepted Date: October 25, 2023
Published Date: January 01, 2024

Citation: Asma RA Chaudhry, Asma Malik Azmi, Asif Ali Chaudhary, Fouzia Farooqui, S. Saleemunnisa Yousuf. Examining the Medicinal Role of Alum in *Unani* Medicine: An Overview of Traditional Uses and Scientific Investigations. Journal of AYUSH: Ayurveda, Yoga, Unani, Siddha and Homeopathy. 2024; 13(1): 1–9p.

Keywords: Alum, traditional, *Unani*, scientific study, *Phitkiree*, *Shibb-e-Yamani*

INTRODUCTION

Alum presents itself as translucent, colorless, and white, appearing either as crystalline masses or in granular powder form, offering a sweetly astringent taste [1]. Upon heating, it undergoes a melting transformation, and around 200°C, it releases its

crystalline water content, leading to the creation of anhydrous salts [2]. In its raw form from markets, impurities are often present, but it can be refined for medicinal use by dissolving it in boiling water, straining the solution, and subsequently evaporating it to yield crystals that are stored for application [3]. Within the category of alum, a collection of hydrated double salts exists. Typically, these compounds consist of aluminum sulfate, water molecules forming part of their structure, and the sulfate of another element. The most commercially significant alum is aluminum potassium sulfate, commonly referred to as potassium alum or potash alum. Its production involves evaporating a water solution containing both aluminum sulfate and potassium sulfate.

The combined family of alums serves a multitude of vital purposes. This encompasses the creation of medicines, textiles, sugar, paper, paints, matches, and deodorants. Furthermore, they play roles in baking powder, fire extinguishers, acting as binding agents (mordants) in dyeing, serving as agents for aggregating (flocculating) in water purification, and contributing to paper waterproofing [1]. The term 'alumen' traces back to Pliny's Natural History. Within his writings, Pliny mentioned that 'alumen' could be naturally sourced from the Earth, labeling it as 'salsugoterrae' [4]. Potash alum, also known as Potassium Aluminium Sulphate, stands as an inorganic salt [5]. It manifests as transparent, odorless, and colorless crystalline masses or granulated powder, characterized by a mildly astringent taste. Under the influence of heat, it liquefies, shedding its crystalline water content around 200 ºC, resulting in an anhydrous salt. Solubility-wise, it dissolves in a ratio of 1 part to 7.5 parts of water, 1 part in 0.3 part of boiling water, and 1 part in 3 parts of glycerol. A 10% solution in water registers a pH ranging from 3 to 3.5, while 6.35% solution exhibits iso-osmotic properties with serum [6]. Alum operates through its astringent properties, causing proteins to precipitate on cell surfaces and within superficial interstitial spaces. This process leads to a reduction in capillary permeability, contracting intercellular spaces, initiating vasoconstriction, reinforcing capillary endothelium, and ultimately diminishing conditions such as edema, inflammation, and exudation. Its applications are diverse; for instance, it finds use in gingivitis cases, as well as in managing mucositis and oral ulcers. Notably, alum plays a crucial role in purifying drinking water, particularly in developing nations such as Bangladesh. Recent reports highlight its efficacy in decontaminating household water [7, 8].

Studies have revealed alum's role in cough remedies. Notably, it is a component employed to precipitate diphtheria toxoid—a form of immunization with heightened effectiveness as compared to fluid toxoid. Alum significantly bolsters humoral responses in vaccines targeting diphtheria, tetanus, and hepatitis B, rendering it a widespread inclusion in bacterial vaccines. Its therapeutic scope extends further to the treatment of lead colic and as an emetic for poison-related cases. In the context of stomatitis and pharyngitis, a solution ranging from 1% to 4% serves as a mouthwash or gargle. For superficial abrasions, cuts, and ulcers on the lips, solid alum or an alum solution can be applied directly, acting as a hemostatic agent [6].

Chemical Formula: $K_2SO_4.Al_2(SO_4)_3.24H_2O$ [9]

Vernaculars [10-21]

Alum is known by different vernacular names:

- *Shab, Zaje-abyaz, Zaj, Shibbe Yamani* (Arabic)
- *Phitkari, Phatkiri, Phatphadi* (Bengali)
- *Sambe-mani* (Bombay)
- *Keo-Khin, Khin, Kyouh-Kyen* (Burm)
- *Phati-Kara*, *Pati Kara* (Canarese)
- Alum, Aluminous sulphate, Sulphate of Alumina and Potash, Sulphate of Aluminium and Ammonium (English)
- *Phatkari* (Gujrati)
- *Phitkari, Phitikhari, Phitkiri* (Hindi)
- *Alyosan* (Latin)
- *Patikar*, *Turati*, *phitki, Phatki* (Maharashtra)

- *Chinik-karam, Tawas* (Malyalam)
- *Fatkar*i (Panjabi)
- *Zak, Shab-i yemeni, Zake bilor, Zake safed, Zama, Zaj, Zaj Safed (Persian)*
- *Sanqarya (Roomi)*
- Sphatikari, Surashtraja, Kamakshi, Tuvari (Sanskrit)
- *Pitki* (Sindhi)
- *Pati-karam, Padikharam, Shinacarum (Tamil)*
- *Pati-karam, Pattikaramu, Padikharam*(Telgu)
- *Filfilul-Quais* (Unani)

MIZAJ (TEMPERAMENT) [22, 23]

Hot and dry.

MAHIYAT (DESCRIPTION IN UNANI LITERATURE)

Unani scholars have meticulously detailed the morphology of Alum, known as *Shibb-e Yamani*. This mineral salt exhibits distinct characteristics. It possesses a yellowish-white hue, resembling the translucency of *'Boraq'* while having an appearance akin to *'Zarneekh'*. Although initially soft like common salt (*Namak*), it solidifies upon exposure to air. With an inherent acidity, it can be broken into smaller fragments and ground manually. One of its applications lies in dyeing, where it serves as a binder. The dye-subjected material undergoes a process involving immersion in *a Shibb-e-Yamani* solution, followed by drying and subsequent dipping into a dye solution to attain the desired hue. Notably, the finest *Shibb-e-Yamani* is sourced from Egypt, while the variety found in the mountainous regions of Yemen is referred to as *Shibb-e-Yamani* [10]. Alum can be understood as a liquid encompassing septic components of the Earth, which undergoes condensation due to cold, similar to common salt (*Namak*) and *Naushadar*, yet distinct from stone. Its presence extends across regions such as Yemen, Egypt, Rajasthan, Bihar, Cutch, and Punjab. It can be classified into 17–18 types on the basis of color, form, and texture,

1. However, three prevalent and commonly used *Shibb-e-Yamani* types are as follows [19]: A yellowish-white, transparent variant, possessing a relatively heavier quality and inducing an astringent sensation on the tongue. It holds lesser acidity and goes by the name "*mushaqqaq*," originating from Yemen, hence referred to as *Shibb-e-Yamani*.
2. The second type appears as round pieces, lending a subtle numbing effect to the tongue. It carries an acidic taste and is labeled as "*Zaj Madharaj wa Mustadbar."*
3. The third kind is soft and prone to breaking easily, offering a slightly damp sensation upon touch. It emits an unpleasant odor and is identified as *Shibbe Zafar, Zaje Zafar, or Shibbe Ratab.* The ideal version is characterized by translucency and a milky color.

Alum boasts a spectrum of colors, including red, white, yellow, green, and black. The white variety earns the name *Qalqadees*, while the yellow is referred to as *Qalqatar*. Green alum is recognized as *Qalqand*, and the red variant goes by the term Soori [24, 25].

FUNCTIONS (ACTIONS)

- ***Qabiz*** (astringent) [26, 27]
- ***Mussakkin*** (analgesic)
- ***Habissuddam*** (haemostatic/styptic) [22, 23, 28]
- ***Mujaffif*** (desiccative) [26, 27, 29]
- ***Mukhrije janeen wa mashema*** (expulsive for foetus and placenta), *Daf'e humma* (antipyretic) [26, 27]
- ***Jali*** (detergent) [26]
- ***Akkal*** (corrosive) [26]

- ***Munaffise balgham*** (expectorant) [27]
- ***Muqai*** (emetic) [26]
- ***Mudir*** *Dafe naubat* (antipyretic) [26]
- ***Muhaiyyaj wa Musahhaj*** (irritant) [22]

MOLECULAR WEIGHT [30]

458.28 g

COMPOSITION

Potassium, Aluminium, Hydrogen, Sulphur, and Oxygen [30].

***MIQDARE KHURAK* (Dosage)** [22, 26, 27]

250–500 mg

***MUZIR* (Adverse Effect) [**26, 27]

Lungs, stomach and intestine.

DISTRIBUTION

Alum is naturally occurring in regions such as Egypt, Italy, England, Germany, and India. Within India, it is predominantly located in Assam, Punjab, and Bihar [29].

***ISTEMAL* (USES)**

- Alum demonstrates notable efficacy in addressing conditions related to the kidney, urinary bladder, and eyes [20, 31].
- Its properties, encompassing *qabiz* (astringent), *habisuddam* (hemostatic), and *mujaffif* (siccative), render it a valuable therapeutic agent employed as *Mazmaza* in a variety of ailments. These encompass *quruh lissa* (ulceration of the gums), *sailane khoon lissa* (bleeding gums), *istarkhae lissa wa tahriq dandan* (gum and teeth looseness), *qula'a* (stomatitis), warm *lauzatain* (tonsillitis), and *warm-e-halaque* (pharyngitis).
- Powdered oral administration proves beneficial in addressing *sailanur rahem* (leucorrhea) and *jiryan-e-dam* (bleeding) [12, 30]. When employed in conjunction with *ganadana* water, alum effectively curbs uterine bleeding. Alum water serves as an efficient uterine douche for *sailanur rahem* (leucorrhea), vaginal itching, inflammation, and post-delivery uterine wall constriction.
- In cases of nasal bleeding and nasal injuries, alum solution syringing is recommended. Roasted alum, known as *Shibb-e-Yamani biryan*, acts as a remedy for hemorrhage control and gum strengthening. It is also combined with honey and vinegar for tooth application to enhance their strength. In combination with honey, alum proves beneficial for addressing stomatitis (*qula*) [20, 32, 33].
- Alum's antiseptic attributes make it advantageous in addressing concerns such as *phode, phunsi, suzaak, sailan-e-uzn, sar ki joon, sar ki bhoosi* (dandruff), and axillary odor. Its antispasmodic properties find relevance in conditions such *kali khansi* (whooping cough), *zeequn nafas* (asthma), and *sua'al* (cough) [12, 30].
- The administration of alum powder in a quantity of 3 g induces vomiting, serving to alleviate conditions such as *khunaque* (diphtheria) and *surfa* (cough). Alum's combination with 14 *a'ab-e-zift* proves effective for dandruff elimination [12].
- Harnessing its haemostatic quality and *mujaffif-e-ratubat* attributes (siccative), alum serves as a haemostatic agent for minor wounds by constricting blood vessels. Its therapeutic application extends to wound cleansing through decoctions and the sprinkling of roasted alum on infected wounds [34].
- To address *aashob e-chashm* (conjunctivitis), an eye drop is created by incorporating 2 *ratti* (250 mg) of alum into 2 tola (25 ml) of rose water. This alleviates eye discomfort and redness. The

preparation's *matbookh* (decoction) or local use as a *humool* (tampon) is applied to induce the expulsion of the fetus and placenta. Alum finds utility in addressing conditions such as *sozish-e-andam-e-nehani, kharish-e-sailanur rahem, kushadgi-e-rahem, bad wazaie rahem, khuruej maqad,* and *bawasir* [34].

- For epistaxis and nose wounds, a mixture of alum and water is employed for syringing. Internally, it can be ingested with milk to alleviate pain resulting from injuries or falls. In the case of chronic diarrhea, alum is consumed in powdered form. In instances of *naubati bukhar* (intermittent fever), when constipation is absent, its administration a few hours prior to the fever can lead to fever cessation [35].
- Alum assumes a primary role in treating hemorrhagic disorders, including *istehaza, nafsud dam, qayam-e-kabdi (damwi),* and *balgami pechish* [36]. It is ingested orally alongside 1 g of *misri* in cases of *warm-e masana wa gurda* (inflammation of bladder and kidneys). Alum's efficacy extends to headache relief as well [32].
- Epistaxis and nose wound management involves the mixture of alum with water for syringing. Internally, it can be ingested with milk to alleviate pain from injuries or falls. In the context of chronic diarrhea, powdered alum is taken. For *naubati bukhar* (intermittent fever), when constipation is absent, its administration a few hours prior to fever onset can effectively halt the fever's progress [20].

THERAPEUTIC USES

The scientific literature also extensively outlines the therapeutic applications of alum, spanning a wide range of conditions.

Internal Uses

- Alum is employed therapeutically for a myriad of ailments, including leucorrhoea, haematuria, haemoptysis, menorrhagia, gastric and intestinal catarrh, as well as various forms of haemorrhages. It is effective against chronic diarrhea, dysentery, atonic discharges, asthma, narcotic poisoning in children, and whooping cough.
- Alum is also used to counteract the effects of serpent and animal bites, treat malaria, obstinate hiccup, guinea worm infestations, renal and uterine hemorrhage, bleeding piles, epistaxis, enteric fever, diabetes, albuminuria, ulcerated sore throat, aphonia, atony of the larynx, spongy or bleeding gums, and various oral issues.
- Additionally, it proves valuable in addressing conditions such as diphtheria, croup, pharyngitis, chronic and purulent ophthalmia, chronic conjunctivitis, otorrhoea, recent ecchymosis, contusions, sprains, and umbilical ulcers in infants.
- For chronic diarrhea, a combination of 10 grains of alum, 5 drops of laudanum, and 1½ ounces of acorus root infusion is beneficial. In cases of whooping cough after the acute stage, 2–4 grains of alum are administered twice or thrice daily in powder or solution form with omum water.
- In cases of injuries leading to brain concussion, spinal cord trauma, severe sprains, or fractures, a dose of 5 grains of alum with treacle or sugar is recommended. Alum, mixed with treacle, is given internally for guinea worm infections.
- An alum lotion is employed internally to counter internal hemorrhages from lungs, stomach, kidneys, or other organs, and to control excessive menstrual flow. Small doses of alum, ranging from 2 to 10 grains, effectively address conditions such as strangury and vomiting.
- Alum is used in various dosages to manage asthmatic spasms, and in 5 grains with half an ounce of rose water twice a day for asthma and cough. Desiccated alum in 5-grain doses, taken with a teaspoon of water, offers positive outcomes in malaria patients if ingested two hours before expected rigors [18].

External Uses

- Alum's external applications are diverse and encompass treating uterine and anal prolapse, stemming nose, gum, vaginal, and rectal bleeding, managing excessive sweating in armpits, groins, and soles of the feet, addressing leech bites, and cuts.

- It finds use as a hair dye and hair lotions. It is also applied locally in conditions such as diphtheria, croup, and pharyngitis as a collyrium.
- Alum proves effective in managing conditions such as relaxed or ulcerated sore throats, aphonia, larynx atony, bleeding or spongy gums, loose teeth, mouth and tongue ulcers, and tongue fissures related to consumption.
- In cases of ear inflammation, a mixture of alum, gypsum, and *Gil-e Armani* is applied, and it serves as an ear drop for otitis externa. Sterilized cotton plugs soaked in alum powder or lotion provide immediate cessation of bleeding in postpartum hemorrhage and menorrhagia.
- Local application of cloth soaked in a solution of alum decoction or babul bark decoction assists in addressing bleeding piles and anal prolapse, especially in children [18].

Pharmacological Investigations

Recent years have witnessed a surge in pharmacological studies exploring the multifaceted effects of alum. These investigations have illuminated several crucial pharmacological impacts, including:

- ***Antibacterial Properties:*** Recent in vitro research delved into the potency and safety of potassium Aluminum tetraoxosulphate (Alum) for treating tuberculosis. Employing the proportion method, the study revealed that *Mycobacterium tuberculosis* exhibited resistance to alum extract at the highest concentration of 0.003 g/ml. In contrast, the standard drug (Streptomycin) effectively inhibited the growth of *M. tuberculosis* at the same concentration. Histological analysis of various organs unveiled normal morphology devoid of inflammation. Statistical comparison of experimental animal weights against controls revealed no noteworthy weight disparities, and no mortality occurred throughout the experimental phase. Histological investigations indicated that alum, at the utilized concentration, was relatively safe for mammalian consumption but exhibited inefficacy against *M.tuberculosis* [37].
- ***Antimicrobial Activity Assessment:*** Propolis, alum, and plant aqueous extracts were subjected to antimicrobial scrutiny at a concentration of 50% through the well-diffusion method, yielding discernible inhibition zones. Notably, at this concentration, maximum inhibition zone diameters observed were 35 mm and 40 mm in Salvadora persica and alum, respectively. Propolis exhibited a 30 mm inhibition zone, while both green tea and clove displayed equivalent inhibition zones of 20 mm. The lowest inhibition zone, measuring 10 mm, was noted in black tea [35].
- ***Antimicrobial Activity:*** The antimicrobial potential of crude extracts from two widely utilized medicinal resources, alum and clove, was assessed across varying concentrations (10%, 20%, 30%, 40%, and 50% w/v%). Employing the agar well diffusion method, minimum inhibitory concentrations (MIC) and inhibition zone diameters were ascertained for *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Escherichia coli*, and *Klebsiella pneumoniae*. Demonstrating antibacterial efficacy, both medicinal substances hindered the growth of both Gram-positive and Gram-negative bacteria that were isolated from diverse infection sites [38].
- ***Antiplatelet Activity:*** An investigation explored the in vivo effects of alum on platelet aggregation and bleeding time in rabbits. Turbidometric measurements of collagen-induced platelet aggregation in platelet-rich plasma from healthy rabbits were conducted before and an hour after intravenous alum injection. Following alum injection, collagen-induced platelet aggregation significantly decreased. Moreover, bleeding time from an ear puncture in eight rabbits was notably extended after intravenous alum injection. These findings suggest the potential of alum as an oral antiplatelet agent, warranting further exploration while considering potential side effects, particularly in patients with compromised renal function [35].
- ***Anti-Obesity Effects:*** In Wistar rats fed a high-fat diet, oral consumption of potash alum led to substantial reductions in body weight, food intake, serum triglycerides (TGs), total cholesterol (TCs), and high-density lipoproteins (HDL). Simultaneously, it increased dry fecal weight and total fecal lipids, as compared to controls fed a high-fat diet [11].
- ***Spermicidal Impact:*** Alum's viability and motility effects vary across different concentrations of potash alum. At a 15% concentration, the time of death was 51.9 sec, while at 10%, it was 87.2 sec, and at 5%, it was 122.1 sec [39].

- ***Larvicidal Properties:*** The larvicidal potential of potash alum was explored to control mosquito larvae, specifically *Anopheles stephensi*, under laboratory conditions. The LC50 and LC90 values of alum were tested against various instars of mosquito larvae after 24 h of exposure. Control groups showed no mortality throughout the experiment. Potash alum effectively impacted all instar larvae. LC50 and LC90 values for various larvae ranged between 2.1 to 48.74 ppm and 15.78 to 93.11 ppm, respectively [40].
- ***Healing Attributes:*** In a randomized double-blind placebo-controlled study involving 52 patients with recurrent aphthous ulceration (RAU), treatment with different concentrations (1%, 3%, 5%, 7%) of alum suspension, along with placebo, exhibited notable outcomes. Application of potash alum demonstrated a significant reduction in ulcer healing time as compared to the placebo group, suggesting its potential as a healing agent for RAU [6].
- ***Haemostatic Effect:*** A prospective trial involving 45 patients undergoing tonsillectomy compared the use of aluminium potassium sulfate as a haemostatic agent on one side and gauze packs on the other. Application of aluminium potassium sulfate in the tonsillar fossae led to significant reductions in operation time, operative blood loss, and the number of ties used, as compared to the control side treated with gauze packs [41].

CONCLUSION

The historical use of *Shibb-e-Yamani* (alum) as a therapeutic agent spans countless generations, addressing a broad spectrum of health conditions. Its longstanding utility has prompted comprehensive explorations through both experimental and clinical studies. These investigations have unveiled a diverse range of effects, including antibacterial, antiplatelet, haemostatic, healing, larvicidal, anti-obesity, and spermicidal properties. Remarkably, scientific scrutiny has largely substantiated the claims put forth by traditional medicine. Nonetheless, the potential for further in-depth clinical research remains compelling, aiming to uncover the complete therapeutic dimensions of this substance and potentially elevate it to the status of a standardized pharmaceutical agent.

Acknowledgement

Authors are thankful to authors and editors of all those books and journals from where the literature for this article has been reviewed, discussed and cited.

Funding

No funding sources

Conflict of Interest

None declared

REFERENCES

1. Anonymous. The New Encyclopaedia Britanica. The University of Chicago. 1989; VOL I, XI, XXI: 303p, 367p, 388p.
2. Martindale. The Extra Pharmacopoeia, 28 edn. London: The Pharmaceutical Press; 1982; 283p.
3. Nadkarni AK. Indian Materia Medica, Vol II. Mumbai: Bombay Popular Prakashan; 1954. 2–6p.
4. Alum. Wikipedia [Internet]; 2015. Available from: http://en.wikipedia.org/wiki/Alum [cited 2015, 12th May].
5. Udoe tok IA, Akpanudo NW, Uwanta EJ, Ubuo EE, Ukpong EJ. Effect of Potassium Aluminium Sulphate, $KAl(SO_4)_2$ on the Total Petroleum Hydrocarbon of Diesel Oil. International Journal of Material and Chemistry. 2012; 2(3): 101–104p.
6. Altaei TS, Al-Jubouri RH. Evaluation of the efficacy of alum suspension in treatment of recurrent ulcerative ulceration. J College Dentistry. 2005; 17(2): 45–48p.
7. Al-Huwaizi RF, Al-Alousi WS. The effects of different concentrations of Alum solutions on Mutans streptococci (in vitro study). J Bagh College Dentistry. 2013; 25(1): 146–151p.

8. Chowdhury MAR, Huq A, Xu B, Madeira FJ, Colwell RR. Effect of Alum on Free Living and Copepod-Associated Vibrio cholera O1 and O139. Applied and Environmental Microbiology. 1997; 63(8): 3323–3326p.
9. Osuala FI, Ibidapo-obe MT, Okoh H, Alna O, Nshiogu M, et al. Evaluation of the Efficacy and safety of Potassium Aluminium Tetraoxosulphate (Vi) (ALUM) in the Treatment of Tuberculosis. European Journal of Biological Science. 2009; 1(1): 10–14p.
10. Aawan MH. Kitabul Mufradat Al-Maroof ba Khawasul Advia Batarz-e-Jadeed. Lahore: Shaikh Ghulam Ali & Sons (Pvt.) Ltd.; 1984. 166–67p.
11. Ahmad S. Khazainul Malook. Matba Nizami. 1314H; 1: 208–209p.
12. Hasan DM, Ali DA. Advia Madania. New Delhi: Aijaz Publication House; 2004. 12–14p.
13. Husain MM. Makhzanul Advia maa Tohfatul Momineen. Delhi: Matba Mohammadi; 1285H. 316p.
14. Ibn Baitar Z. Al-Jame le Mufradat al-Advia wal Aghzia, Vol 1. Delhi: Kaas Enterprises; 1197. 314–319p.
15. Khan MA. Moheet-e-Azam, Vol 2. Kanpur: Nizami Press; 1313H. 82–83p, 375p.
16. Kintoori GH. Tibb-e-Islami ka encyclopedia (Urdu translation of Al-Qanoon fit Tib – Ibn Sina), Vol 2. Lahore: Book Printers; 1992. 90-91pp
17. Nabi MG. Makhzan Mufradat wa Murakkabat maroof ba Khawasul Advia. Delhi: Matba Iftekhar; 1920. 282p.
18. Nadkarni AK. Indian Materia Medica, Vol 2. Mumbai: Bombay Popular Prakashan; 1954. 2–6p.
19. Najmul GM. Khazainul Advia. New Delhi: Idara Kitab al Shifa; 2011. 482–485p.
20. Tarique NA. Tajul Mufradat. New Delhi: H.S. Offset Press; 2010. 211–213p.
21. Waring EJ. Remarks on the uses of some of the Bazaar Medicines and Common Medicinal Plants of India, 5th Edn. Dehradun: Bazaar Medicines of India; 1982. 17–22p.
22. Kabeeruddin M. Ilmul Advia Nafeesi. New Delhi: Ejaz Publishing House; 2007. 259–260p.
23. Mohd. R. Kanzul Advia Mufredah. Aligarh: University Publication Unit; 1985. 453–455p, 650p, 651p.
24. Khan MA. Moheet-e-Azam, Vol II. Kanpur: Nizami Press; 1313H. 82–83p, 375p.
25. Kintoori GH. Tibb-e-Islami ka encyclopedia (Urdu translation of Al-Qanoon fit Tib – Ibn Sina), Vol II. Lahore: Book Printers; 1992. 90–91p.
26. Kabeeruddin M. Makhzanul Mufradat. New Delhi: Ejaz Publication House; 2007. 556–557p.
27. Tariq NA. Tajul Mufredat. New Delhi: Idara Kitabul Shifa; 2010. 211–222p.
28. Ghani N. Khazainul Advia. New Delhi: Idarae Kitabul Shifa; YNM. 482–485: 1273p, 1274p.
29. Sayeed A. Kitab al-Fath fi al-Tadawi (Urdu Translation), 1st ed. Delhi: NCPC; 2007. 212p.
30. Kumar DS. Advia Madania. Deoband: Masood Publishing House; 2013. 18–19p.
31. Abdul Hakim M. Bustanul Mufradat. Delhi: Zafar Book Depot; 1999. 115p.
32. Qutbuddin AHA. Tibb-e-Ahsani. Lucknow: Naval Kishore Press; 1917. 219p.
33. Ibn Baitar Z. Al-Jame le Mufradat al-Advia wal Aghzia (Urdu translation), Vol III. New Delhi: CCRUM; 1999. 118–119p.
34. Kabiruddin M. Makhzanul Mufradat (ba khawasul advia). Delhi: Maktaba Naimia; YNM. 173–174p.
35. Mohammad HH. In vitro antibacterial activity of propolis, alum, miswak, green and black tea, cloves extract against porphyromonas gingivalis isolated from periodontitis in Hilla city, Iraq. Am J Phytomed Clin Therap. 2013; 1(2): 140–148p.
36. Takmeeli IH. Advia Unania. Lucknow: Nizami Press; 1987. 111–112p.
37. Osuala FI, Ibidapo-obe MT, Okoh HI, Aina A, Nshiogu M, et al. Evaluation of the efficacy and safety of potassium aluminium tetraoxosulphate (Vi) (ALUM) in the treatment of tuberculosis. European Journal of Biological Sciences. 2009; 1(1): 10–14p.
38. Bnyan IA, Alta'ee AH, Hassan N. Antibacterial activity of aluminum potassium sulfate and syzygium aromaticum extract against pathogenic microorganisms. Journal of Natural Sciences Research. 2014; 4(15): 11–14p.
39. Singh HP, Singh CK, Singh RR. Effect of potash alum (alluminium potassium sulphate) on human semen and sperm. Indian J Pharmacol. 1998; 42(2): 311–314p.

40. Preet S, Seema KC. Mosquito larvicidal potential of potash alum against malaria vector Anopheles stephensi (Liston). J Parasit Dis. 2010; 34(2): 75–78p.
41. Al-Abbasi AM. The Benefit of Alum in Tonsillectomy. Gomal Journal of Medical Sciences. 2009; 7(2): 124–127p.

