

Khabasul Hadeed (Iron Rust): An Important Mineral Drug of Unani Medicine for the Management of Hematopoietic Disorders Especially Anaemia

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Abstract

Khabasul Hadeed (Iron rust) is a mineral drug used in different dosage forms in Unani Medicine and claimed to be effective in the management of hematopoietic disorders. This paper especially reviews the role of *Khabasul Hadeed* in the management of hematopoietic disorders (anaemia) as mentioned in Unani literature. The result of review reveals that *Khabasul Hadeed* as such and as an ingredient in various formulations has been used for the treatment of anaemia since ancient times by the practitioners of traditional medicine. Literature of Unani Medicine clearly indicates that *Khabasul Hadeed* and its different formulations are safe and have hematopoietic effect. Sufficient information in respect of morphological, physicochemical and ethnomedicinal properties of *Khabasul Hadeed* are available but a very few pharmacological and clinical studies have been conducted. Modern scientific reports, though scarce, also suggest the possibility of such hematological effects of this drug.

Keywords: Anaemia, Iron rust, *Khabasul Hadeed*, Mineral drug

Introduction

Unani Medicine uses three natural sources of drugs, i.e. plants, animal products and minerals, in different dosage forms. Individual natural drugs and their products have been comprehensively documented in traditional as well as scientific literature for their healing properties (Ahsan and Zafar, 2012; Makbul, *et al.*, 2017).

The use of metals in medicinal preparations is common in Unani Medicine. Minerals formed an important part of the Egyptian and Mesopotamian *Materia Medica* and acted as an active component in many effective remedies (Vohora and Athar, 2008). Some allopathic formulations also contain metals like cisplatin, carboplatin, colloidal gold, silver sulphadiazine (Silvadane) and ferrous gluconate for different therapeutic purposes (Nagarajan, *et al.*, 2014). The medicinal use of mineral origin drugs, methods of their purification and the pharmacological properties have been mentioned by many eminent scholars in their books (Hafeez, 2010; Kabiruddin, 2011).

The survey of Unani literature shows that *Khabasul Hadeed* (Iron rust) has a long history of use as an important drug for the treatment of hematopoietic disorders including anaemia. Chemically, *Khabasul Hadeed* is Ferrosferric oxide, commonly known as iron rust. It is also known as impure oxide of iron, magnetic iron oxide and magnetite. It consists of small particles of iron scattered round the blacksmith's anvil which on exposure to air becomes rusty (Anonymous, YNM and Nadkarni, 2010). In Unani Medicine, a particle

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which during beating of metals scatters as a forge scale is known as *Khabs* (rust). For iron, it is known as *Khabasul Hadeed*, which is driest of all rusts (Ibn Baitar, 1999; Hakim, 2002; Ghani, 2011). *Khabasul Hadeed* as a single drug in powder form or in combination with other drugs has been widely used in Unani Medicine for treating blood disorders, viz. anaemia. It is also an important ingredient of several formulations, viz. *Kushta Khabasul Hadeed*, *Habb-e- Khabasul Hadeed* (Said, 1997), *Majoon Fanjanoosh* (Kabiruddin, 2006), *Majoon Khabasul Hadeed* (Anonymous, 1986), *Majoon Bawaseer* (Usmani, 2008), *Majoon Murraweh-ul-Arwah* (Said, 1997), *Jawarish Khabasul Hadeed* (Kabiruddin, 2006), *Safuf Khabasul Hadeed*, *Safuf Fauladi*, *Sanoon Chob Chini* (Usmani, 2008), *Arq-e-Khabasul Hadeed* (Kareem, YNM) *Dolabi*, *Anushdaru* (Kabir, 2003), *Dawa-i-Atiya Allah* (Ibn Sina, 2006), *Habb-e Sandaroods* (Anonymous, 2007), *Itrifal Khabasul-Hadeed* (Anonymous, 2007), *Jawarish Khuzi* (Anonymous, 2006), *Majoon Muqawwi Mi'da* (Anonymous, 2008), *Qurs Salajit* (Anonymous, 2008), *Sufuf Khabasul-Hadeed Mujarrab* (Khan, 1996) and *Hamool Muqawwi Reham* (Anonymous, 2006). Since literature available on this important drug is very scant, therefore, in the present paper an attempt has been made to compile the available information on *Khabasul Hadeed* and its different formulations so as to bring to light the therapeutic potential of this lesser known drug.

Methodology

A review of literature on *Khabasul Hadeed* was done using the bibliographic database, viz. PubMed, Google Scholar, Science Direct, Scopus and other internet sources. The search was conducted using the terms '*Khabasul Hadeed*', 'Iron rust', 'Ferrosferric oxide', 'impure oxide of iron', 'Magnetic iron oxide', 'Magnetite' '*Majoon Khabasul Hadeed*', '*Arq-e-Khabasul Hadeed*' and '*Kushta Khabasul Hadeed*'. Further classical books published in Urdu and English were used to compile the information.

Description of *Khabasul Hadeed* in Ancient Literature

According to Hakim Muhammad Azam Khan, in Persian *Khabasul Hadeed* (Iron oxide) is known as *Noosh*, *Charak Aahan* and *Reem Aahan*. In *Sheeraji*, it is called as *Ramah* and in Hindi it is known as *lohe ka mail* (dust of iron) and *Keet*. The standard *Khabasul Hadeed* is the dust which is obtained from melted iron, consisting of purified, uniform in size, soft and fine particles. According to Sheikh, this *Khabasul Hadeed* is of the driest nature (Khan, 1996). *Khabasul Hadeed* is not used as drug in natural state; rather it is first detoxified and powdered or converted into *Kushta* (calx) before consumption. According to Hakim Karim Bakhsh, after detoxification, *Khabasul Hadeed* is also used in the preparation of certain *Majoon* viz. *Majoon Khabasul Hadeed*, also called *Majoon Fanjnosh*. It is used for debility of stomach, liver, anaemia, ascites and piles. It

is also recommended for aphrodisiac effect, bleeding disorders and incontinence of urine. *Khabasul Hadeed* is also called *Aab-e-Hayat*. *Khabasul Hadeed* can well substitute Faulad (iron) products in case of the latter's unavailability (Kareem, YNM).

Hakim Najmul Ghani and Hakim Karim Bakhsh mention that *Khabasul Hadeed* used for the preparation of *Kushta Khabasul Hadeed* should be *sadsala* (hundred years old) for best therapeutic uses (Ghani, 2011; Kareem, YNM).

Ethnomedicinal Uses of *Khabasul Hadeed*

Khabasul Hadeed has been used as a haemopoetic agent and to treat anaemia and bleeding disorder, viz. dysmenorrhea, menorrhagia, piles, haemoptysis and melena (Ghani, 2011). Ibn Baitar (1197–1248 CE) wrote that Galen (129–200 CE) claimed it to be a tested (Mujarrab) drug in treating otorrhoea. Ibn Baitar (1197–1248 CE) also wrote that Ibn Sina claimed it to be a tested (Mujarrab) drug in treating menorrhagia, polyurea and for increasing the tone of rectal sphincter. *Khabasul Hadeed* / *Mandura* is especially useful in anaemia, amenorrhoea, dysmenorrhea, menorrhagia, chlorosis, diarrhoea, chronic bowel complaints, dyspepsia, intestinal worms and nervous diseases, neuralgia of the 5th nerve due to debility, kidney diseases, albuminuria, etc. (Nadkarni, 2010). The efficacy of *Khabasul Hadeed* in case of polyurea has also been proved and *Kohl (Surma)* of *Khabasul Hadeed* is useful in dryness of eyelids while ear drops prepared from *Khabasul Hadeed* is used for cleaning ear wax (Khan, 2013). The uses and indications of *Kushta Khabasul Hadeed* are mentioned in Hamdard Pharmacopoeia, National Formulary of Unani Medicine and other renowned Unani pharmacopoeias as stomachic and liver tonic, haematogogue, curative for debility of liver and stomach and for treating anaemia.

Properties of *Khabasul Hadeed* in Unani Medicine

a. Mizaj (Temperament)

Temperament of *Khabasul Hadeed* has been described to be *Har* and *Yabis* (Hot & Dry) in third degree (Khan, 2013). According to another statement, the temperament of *Khabasul Hadeed* has been described to be *Har* and *Yabis* (Hot in second degree and Dry in third degree) (Khan, 2013).

b. Pharmacological Actions

Mujaffif (Desiccant), *Habisuddam* (Styptic), *Muqawwi-e-Mi'da*, *Muqawwi-e-Jigar*, *Muqawwi-e-Tihaal*, *Muqawwi-e-Qalb* and *Muqawwi-e-Dimagh* (Ghani, 2011).

c. Therapeutic Uses

Khabasul Hadeed is used after making it *Maghsool* (washing) and *Mudabbar* (detoxified). It is used in *Zofe-Meda*, *Zofe-Jigar*, ascites, spleenomegaly and piles. *Khabasul Hadeed* is especially used in anaemia, dysmenorrhea, menorrhagia, chlorosis, dyspepsia, intestinal worms, kidney diseases and albuminuria (Ghani, 2011; Khan, 2013). Mamoon recommends its use as a tested (*Mujarrab*) drug for strengthening the functions of stomach, liver, heart and brain. *Khabasul Hadeed* with *Trikattu* is a household remedy, commonly used as an alternative tonic in the pregnant state (Jeelani, 2017).

d. Substitute

Abdal-e-Advia (substitution of drugs) is one of the important principles that governs the rules pertaining to drug substitution. In case of non-availability of a drug like *Khabasul Hadeed*, Unani scholars have suggested substitutes of this drug namely *Hurf* (*Lepidium sativum*) and other Unani scholars have suggested that substitute of *Maghsool Khabasul Hadeed* is *Itrifal Sagheer* (a Unani semisolid dosage form) (Khan, 2013).

e. Adverse Effects

Some of the drugs having pharmacological activity may also produce toxic effect by their inherent nature. In order to optimize their therapeutic effect, such agents are subjected to certain corrective measures (*Islah-e-Advia*) as described in Unani literature. Thus, the drug is partially modified through specific corrective procedures (*Amal-e-Tadbeer*) to reduce its toxicity. In case application of corrective measures on the drug is not possible, another drug which serves as a corrective agent (*Musleh*) is either admixed or used concomitantly with the first drug for minimizing its undesirable effects. Most of the Unani products are prepared with basic and adjuvant constituents; the adjuvant is meant to act as *Musleh* (corrective agent) of basic drug (Ghani, 2011). *Khabasul Hadeed* has been described as being harmful to lungs. *Kateera* (*Tragacanth gum*) and honey are used as corrective agents to reduce its harmful effect on lungs (Khan, 2013). The corrective agents are supposed to modify the *Mizaj* of *Khabasul Hadeed* to reduce its untoward effects on lungs. Since it possesses hot and dry temperament in third degree, therefore its desiccative property is reduced by combining it with honey or *Kateera*.

f. Dosage

In powder form (of crude drug), it is used in the dose of 1 gm (Khan, 2013), while in the form of *Kushta* (a fine powder form of a drug preparation

obtained by calcining the metals, minerals or drugs of animal origin), it is commonly used in the dose of 125mg twice a day with water (Anonymous, 2008).

g. Advantages of Compound Formulation of *Khabasul Hadeed*

A well-prepared *Kushta* from the drug offers many advantages over plant medicines due to its longer shelf life, lesser dose, easy storability and better palatability (Aziz, *et al.*, 2002; Khan, 1995).

Commonly Used Formulations of *Khabasul Hadeed* in Unani Medicine

Kushta (solid), *Majoon* (semi solid) and *Arq* (liquid) are three important formulations of *Khabasul Hadeed*. Since *Khabasul Hadeed* is a metalloid origin drug, therefore it is preferred to be used in calcined form. The *Kushta* (calx) is prepared by heating *Khabasul Hadeed* at a high temperature to oxidize it. The crude drug is however pretreated with some catalytic agents (particular herbal extract/juice) to make it more efficacious. *Kushta Khabasul Hadeed* possesses hematopoietic and styptic properties. It is used for the treatment of anaemia (Vohora and Athar, 2008).

The toxicity of the metallic constituents is removed by consecutive heat and cold cycles in oil, buttermilk, cow's urine and herbal decoctions, etc. (Nagarajan, *et al.*, 2014). *Kushta* is also prepared as a herbo-mineral preparation, and in this case different herbs or their extracts are mixed with minerals, before, during or after the process of calcination. These metals in combination with the constituents of medicinal herbs are said to form an effective combination useful in the management of diseases. The calcined form has certain advantages over non-calcined form. The dissolution rate of *Kushta* is high, therefore it is readily distributed in the body. It is more potent and quicker in action. Its magnitude of effect and the intensity of biological activities are greater than any other dosage forms used in Unani Medicine (Aziz, *et al.*, 2002).

Before making the *Kushta* form of *Khabasul Hadeed* (Table 1), it should be cleaned and purified. After this, the drug will be ground in pestle and mortar with the specified juices of the known drugs as mentioned in National Formulary of Unani Medicine (Anonymous, 2008) for a specified period of time. Then small cakes of varying sizes and thickness, depending on the nature of the drugs, are made. These are dried well in the shade and put in earthen bowl and then covered by a process known as *Gil-e-Hikmat* (application of specific semi solid materials all around the junction point of the brim of bowls to make it air proof), followed by drying the whole preparation. A particular size pit is dug in an open space to accommodate the vessel for preparation of the calx. Half the pit is filled with the cow dung cakes, then the *Boota* is placed in the pit and

Table 1: Ingredients of *Kushta Khabasul Hadeed*

Unani name	Botanical/Scientific name	Family	Parts used	Quantity (g/ml)
<i>Khabasul Hadeed</i>	<i>Iron oxide</i>	-	rust	250
<i>Sirka desi</i>	<i>Vinegar</i>	-		500
<i>Triphala</i>	<i>Emblica officinallis</i> Gaerth.	<i>Euphorbiaceae</i>	<i>Fruit</i>	250
	<i>Terminalia belerica</i> Gaerth.	<i>Combretaceae</i>	<i>Fruit</i>	
	<i>Terminalia chebula</i> Retz.	<i>Combretaceae</i>	<i>Fruit</i>	
<i>Kakronda Booti</i>	<i>Blumea balsamifera</i> (L) DC.	<i>Asteraceae</i>	<i>Booti</i>	250
<i>Aabe Gheekwar</i>	<i>Aloe barbadensis</i> Mill.	<i>Asphodelaceae</i>	<i>Juice</i>	250

heated by igniting the cakes. After the calcination is over, the pit is allowed to cool completely, the apparatus is removed and the contents are taken out. These contents thus obtained are again powdered with specified juices as many times as prescribed in the text, till the proper fineness and the quality is obtained.

Preparation of *Kushta Khabasul Hadeed*: Small cakes of iron oxide are placed on red hot coal. When they turn very hot, they are transferred with a pair of tongs in to a vessel containing vinegar. It is then separated from vinegar, ground and triturated in the *Triphala* water till all its water content dries up. Now, the iron oxide tablets weighing 10 gm each are dried in Pyrex flask or subjected to *Gil-e-Hikmat* and heated in a pit containing 10 kg of the cow dung cakes which are set on fire. The flask is taken out when all the cow dung cakes have completely burnt out. Then after triturating with *Blumea balsamifera*, it is made in to cakes and heated on 10 kg of the cow dung cakes. On cooling, the metallic oxide is taken out, triturated in the *Aloe barbadensis* juice and heated on 10 kg of the cow dung cakes. The *Kushta* when turns brick red in colour is sieved and preserved in a bottle (Anonymous, 2008; Said, 1997).

***Majoon* (Confection)** is a semisolid preparation made by mixing *Safuf* (powder) of the drug ingredients in *Qiwam* (base, made of purified honey or sugar). The weight of sugar taken to make the *Qiwam* is two to three times of the total weight of powdered ingredients (Kabiruddin, 1938; Said, 1997).

For the preparation of *Majoon Khabasul Hadeed* (Table 2), the powder of Ferric oxide or iron rust is first heated on a cooker heated on burning coal and abruptly cooled in vinegar or in an infusion containing equal weights of *Emblica officinallis*, *Terminalia belerica*, and *Terminalia chebula* (*Aab-e-Triphala*) the procedure is repeated for seven days. The processed or treated iron oxide is added to the safuf of the dry ingredients obtained by grinding and then sieving through 80 no. mesh, after soaking the powder in ghee. The safuf is gradually

Table 2: Ingredients of *Majoon Khabasul Hadeed*

Unani name	Botanical/Scientific name	Family	Parts used	Quantity (g/ml)
<i>Khabasul Hadeed Muddabar</i>	<i>Proceesed ferric oxide</i>	-	<i>rust</i>	50
<i>Balcharr</i>	<i>Valeriana officinalis</i> Lin.	<i>Valerianaceae</i>	<i>Root</i>	50
<i>Ab-e-Triphala</i>	<i>Emblica officinallis</i> Gaerth.	<i>Euphorbiaceae</i>	<i>Fruit</i>	50
	<i>Terminalia belerica</i> Gaerth.	<i>Combretaceae</i>	<i>Fruit</i>	50
	<i>Terminalia chebula</i> Retz.	<i>Combretaceae</i>	<i>Fruit</i>	50
<i>Pipal Kalan</i>	<i>Piper longum</i> L.	<i>Piperaceae</i>	<i>Fruit</i>	50
<i>Soya</i>	<i>Anethum sowa</i> Roxb.	<i>Apiaceae</i>	<i>Seeds</i>	20
<i>Gandana</i>	<i>Nigella sativa</i> L.	<i>Ranunculaceae</i>	<i>Seeds</i>	20
<i>Chita lakri</i>	<i>Plumbago zeylanica</i> L.	<i>Plumbaginaceae</i>	<i>Woods</i>	50
<i>Sonth</i>	<i>Zingiber officinallis</i> Roscoe.	<i>Zingiberaceae</i>	<i>Root</i>	50
<i>Sadkofi</i>	<i>Cyperus scariosus</i> Roxb.	<i>Cyperaceae</i>	<i>Root</i>	50
<i>Filfil-i-siyah</i>	<i>Piper nigrum</i> L.	<i>Piperaceae</i>	<i>Fruit</i>	50
<i>Ghee</i>	-	-	-	50
<i>White sugar</i>	-	-	-	1000

added to a solution/base of sugar which has a specified viscosity. While adding, the solution is continuously stirred so as to mix the contents homogenously. The product is stored in a glass container. The dose of *Majoon Khabasul Hadeed* is 3-5g orally in the morning with 250 ml of yogurt. Its uses and indications are styptic for bleeding piles, stomachic, liver tonic, digestive and appetizing (Kabiruddin, 1938; Said, 1997).

Arq (aqua) is a distillate obtained from one or more medicinal ingredients with or without previous dilution with water. An aqua necessarily, however, postulates the condensations of vapours. *Arq* is a liquid dosage form of Unani system of medicine (Said, 1997). *Arq* of *Khabasul Hadeed* is made from old iron rust powder mixed with two parts of distilled vinegar. The mixture is poured into a clay pot which in turn stands on an iron pot dipped in sand up to a height of four fingers. After heating it on flame for 48 hours, the mixture is filtrated. This procedure is repeated three times in the same manner and the final filterate is known as *Arq-e-Khabasul Hadeed* (Kareem, YNM).

Morphological, Physicochemical and Clinical Studies on *Khabasul Hadeed*

Balasubramaniam, *et al.* (2003) carried out a study on characterization of rust on ancient Indian iron. Rust is a reddish-brown corrosion product of iron consisting of several different constituents. Hydrous ferrous oxide ($FeO.nH_2O$) or ferrous

hydroxide $\text{Fe}(\text{OH})_2$ is the first diffusion-barrier layer formed on the surface. As the pH of saturated $\text{Fe}(\text{OH})_2$ is about 9.5, the surface of such corroded iron is always alkaline. At the outer surface of the layer, access to dissolved oxygen converts ferrous oxide to hydrous ferric oxide or ferric hydroxide (Balasubramaniam, et al., 2016).

Rehman, et al. (2016) carried out a clinical study of *Qurse Kushta Khabsul Hadeed* and *Habbe Marvareed* in the management of *Sailan al-Rahim* (Leucorrhoea). Two important pharmacological compound drugs, viz. *Qurse Kushta Khabsul-Hadeed* and *Habbe Marvareed* have been described to be effective and used in the management of leucorrhoea since long time. A total of 58 cases of fertile age group (13-45 years) diagnosed to be afflicted with leucorrhoea were studied. It was found that out of 58 cases, 36 cases were relieved, 17 partially relieved, while no response was recorded in 05 cases. The drugs were found safe on biochemical and hematological parameters (Rehman et al., 2016).

Akhtar et al. (2013) studied the effect of *Majoon Khabsul Hadeed* on GI bleeding disorders. The constituents of this formulation are *Khabsul Hadeed Mudabbar*, *Oud*, *Saad Kufi*, *Zanjabeel*, *Filfil Siyah*, *Ajwain Desi*, *Izkhar*, *Halila Siyah* and *Halila Zard*. In combination, these constituents impart the drug haemopoietic, anti-ulcerative, ulcer healing, styptic, astringent, anthelmintic and laxative effects. These medicinal properties of *Majoon Khabsul Hadeed* make it useful not only in bleeding hemorrhoids but in all bleeding conditions of gastrointestinal tract (Akhtar et al., 2013).

Akhtar et al. (2011) carried out a study on efficacy of *Majoon Khabsul Hadeed* in *Faqrudam ba Sabab-e-Qillat-e-Faulad* (iron deficiency anaemia/ microcytic-hypochromic anaemia). Significant improvement in symptoms & signs and laboratory findings of the disorder was observed. The formulation was found effective in *Faqrudam ba Sabab-e-Qillat-e-Faulad*, especially improved PCV, MCV and serum iron.

In Unani System of Medicine, many formulations are prescribed for the management of anaemia, like *Majoon Khabsul Hadeed*, *Sharbat-e-Faulad*, *Kushta Faulad*, *Sayyal-e-Faulad*, etc. The researchers concluded that *Majoon Khabsul Hadeed* not only provides iron supplement, but also manages most of the etiologies of *Faqrudam ba Sabab-e-Qillat-e-Faulad* (iron deficiency/microcytic-hypochromic anaemia) (Akhtar et al., 2011).

Jeelani et al. (2017) carried out a study on efficacy of *Safuf Khabsul Hadeed* in iron deficiency anaemia during pregnancy. Results in both groups were highly significant ($p < 0.001$). Better improvement in peripheral smear was observed in control group than test group. No significant improvement in subjective parameters was observed in either group (Jeelani et al., 2017).

Pharmacological Studies on *Khabasul Hadeed*

Somani, *et al.* (2012) carried out a study on prokinetic effect of herbomineral Unani formulation *Dolabi* in diabetic rats. *Dolabi* exerts its prokinetic effect by reducing oxidative stress and therefore can be used as a drug for treating diabetic patients with gastrointestinal impairments. Mechanism underlying the action of *Dolabi* on impaired gastric motility may be neuronal dependent and its antioxidant activity may play an important role. Their data strongly revealed that *Dolabi* exerts a prokinetic action on gastric emptying and intestinal transit in diabetic rats. The study also suggests that antioxidant property of *Dolabi* may be responsible for halting progressive changes of chronic diabetes leading to gastric impairment (Somani, *et al.*, 2012).

Conclusion

Most of the available reports suggest that *Khabasul Hadeed* and its compound formulations possess haemopoietic, astringent and styptic property. Elemental analysis of *Khabasul Hadeed* demonstrated that iron oxide contains iron, which is responsible to maintain serum iron level, normalize the haemopoiesis in the bone marrow and maintain blood level in the body (Vohora, 1983). It is suggested that *Khabasul Hadeed* is very useful in anaemia as well as in bleeding disorders. Most of the studies conducted so far on the formulations are also suggestive of their haemopoietic potential. However, few studies have certain technical, methodological and design related issues. Therefore, before drawing definitive conclusions, it would be prudent to attempt further confirmatory experimental and clinical studies in order to ascertain the efficacy and safety of *Khabasul Hadeed* and its multidrug formulations.

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सारांश

ख़बसुल हदीद (आयरन रस्ट): रक्तोपादक विकारों विशेष रूप से एनीमिया के उपचार हेतु यूनानी चिकित्सा की एक महत्वपूर्ण खनिज औषधि

*हकीक़ अहमद, अब्दुल वदूद, गुलामुद्दीन सोफी और मुदस्सिर खज़ीर

ख़बसुल हदीद (आयरन रस्ट) एक खनिज औषधि है जिसका उपयोग यूनानी चिकित्सा पद्धति में विभिन्न खुराक रूपों में किया जाता है और जिसे रक्तोपादक विकारों के उपचार में प्रभावी बताया जाता है। यह पेपर विशेष रूप से यूनानी साहित्य में उल्लिखित रक्तोपादक विकारों (एनीमिया) के उपचार में ख़बसुल हदीद की भूमिका की समीक्षा करता है। समीक्षा के परिणाम से पता चलता है कि ख़बसुल हदीद का अलग से तथा विभिन्न मिश्रणों में एक घटक रूप में उपयोग पारंपरिक चिकित्सा के चिकित्सकों द्वारा प्राचीन काल से एनीमिया के उपचार के लिए किया जाता रहा है। यूनानी चिकित्सा का साहित्य स्पष्ट रूप से बताता है कि ख़बसुल हदीद और इसके विभिन्न मिश्रण सुरक्षित हैं और रक्तोपादक विकारों पर प्रभाव डालते हैं। ख़बसुल हदीद के मोरफोलोजिकल, फिज़ीकोकेमिकल और एथनोमेडिसिनल गुणों के संबंध में पर्याप्त जानकारी उपलब्ध है परन्तु औषधीय और नैदानिक अध्ययन बहुत कम किए गए हैं। आधुनिक वैज्ञानिक रिपोर्ट हालांकि दुर्लभ हैं, लेकिन इस औषधि के रक्तोपादक प्रभावों की संभावना का सुझाव देती हैं।

शब्दकुंजी: एनीमिया, आयरन रस्ट, ख़बसुल हदीद, खनिज औषधि

