Review Article

Murdarsang: An effective mineral origin Unani drug

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Abstract

Murdarsang is an exotic inorganic Unani drug whose description is traced to the times of Greco-Roman physicians, such as Hippocrates, Galen and Dioscorides. Dioscorides (circa 1st century CE) mentioned it in detail in his celebrated book *'Kitab al-Hashaish*'. Etymologically, it is known as 'Litharge' in English lexicon which is derived from Greek '*Litharguros*' (*lithos* meaning stone and *arguros* for silver) which forms as a 'waste' during the last stage of silver smelting. It is the mainly used externally, especially in almost all types of *marahim* (Unani ointments). It is also used in Ayurveda. Several Ayurvedic formulations contain Murdarsang. Chemically, it is monoxide of lead (*Plumbi oxidum*). Besides its medicinal use, it was used in refining process of silver in the minting technology during the Mughal times. It is one of the mineral forms of lead (II) oxide, PbO. *Murdarsang* (Litharge) is a secondary mineral which forms from the oxidation of galena ores. During the first century CE, both Dioscorides and Pliny, the Elder, discussed in great detail the preparation of *lithargyros* 'silver stone' and *spuma argenti* 'scum of silver'. The golden scum is obtained from the actual vein.

Keywords: *Murdarsang*, Lead oxide, *Plumbi oxidum,* Unani classical literature

Introduction

Murdarsang is an exotic inorganic Unani drug whose description is traced to the times of Hippocrates, Galenand Dioscorides, besides other Greco-Romanphysicians. Dioscorides (circa 1st century CE) mentioned it in detail in his celebrated book *'Kitab al-Hashaish*'.Etymologically, it is known as 'Litharge' in English lexicon which is derived from Greek '*Litharguros*' (*lithos* meaning stone and *arguros* for silver) which forms as a 'waste' during the last stage of silver smelting. It is the mainly used externally, especially in almost all types of *marahim* (Unani ointments). Chemically, it is monoxide of lead (*Plumbi oxidum*). Besides its medicinal use, it was used in refining process of silver in the minting technology during the Mughal times (Haider, 2009).

Murdarsang is one of the natural mineral forms of lead (II) oxide, PbO. Litharge is a secondary mineral which forms from the oxidation of galena ores. It forms as coatings and encrustations with internal tetragonal crystal structure. It is dimorphous with the orthorhombic form massicot. During the first century CE, both Dioscorides and Pliny, the Elder, discussed in great detail the preparation of *lithargyros* 'silver stone' and *spuma argenti* 'scum of silver' for medicinal use of which Pliny in his *Naturalis Historia* says: "It is used to make an eye-wash and women's skin to remove ugly scares and spots and as a hair-wash. Its effect is to dry, to soften, to cool, to act as a gentle purge and to fill-up cavities caused by ulcers and to soften tumours. It also removes erysipelas and likewise chilblains". Both authors apparently rely on the same source of information concerning the metallurgical background of its production.

Dioscorides described its three types in his '*Kitab al-Hashaish*'. According to him *lithargyros* is "one is made from sand called *molybditis* which is roasted until it is totally burned, another from silver, a third from lead. The Attic is excellent, the second is from Spain, followed by those from Dikaiarchia and Sicily" and Pliny notes "The same mines also produce the mineral called *spuma argenti* (scum of silver). Of this, there are three (3) kinds, with Greek names meaning respectively golden (*chrysitim*), silvery *(argyritim*) and leaden (*molybditim*. In silver smelting, silver-bearing

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lead ore is first smelted to gain metallic lead which collects all the silver present, while the gangue minerals form the slags, or *skoriai* (Rehren et al., 1999).

Ethno-pharmacological description

Rabban Tabari (1981) mentioned it in *"Firdaus-al-Hikmat"* for its use in thetreatment of *waram-e-rahem* in *humool*.

Al Biruni described it as *Mudarsanj* in detail in his celebrated book titled *"Kitab al Saidnah fil al Tib".* According to Al Biruni: "It is *litharurus* in Roman and *mardakha* and *yaffyra* in Syriac language. It is *martsang* in Persian. Khalil says that "it is *martuj* while Hamzah calls it *murdahsang"*, whereas Dioscorides says: "Some kinds aremade from a special variety of sand, some from *rasas"*. In the *Al-Hawi*, a statementhas been attributed to the Cato the Censor to the following affect: "*Muldirina* and *mulidhana* which have been described earlier are cooler and more refrigerant thanlitharge." Suhar Bakht says that "it is refined *martak* and it is white in color" (AlBiruni, 1973).

Murdarsang is a *murakkab* (compound) drug made from lead, salt, vinegar etc. It is a heavy yellowish stone. It is said to be of best quality having the characteristics of *asfhani*, bright reddish and brittle (Baghdadi, 2005; Kabiruddin, 2007).

It is made up of *rang* (*qalai*), silver and gold. Its color is red which is made up of gold whereas yellowish-red color while made from silver (Ghani, ynm).

Murdarsang is of two types: *syah* and *zard.* Its *zard* type is best which bitter, *charpara* in taste and hot (Krishan, ynm). Its color *zard* and *sunhara* and *baraq* and insipid in taste (Fazalullah, ynm).

Ibn Hubal Baghadadi (2005) quoted Jalinoos that it neither does *tanqiya* nor produces any dirt. It has no role in increase or decrease in flesh. It is just only an ingredient of *marham*. According to others, it helps growing flesh in wounds. White *maghsoolmurdarsang* is used in *surma* and cleans eyes. It is a *muhllik-e-zahar* (antidote), and its use causing anuria, ballooning of stomach and ureter, whitening of tongue, causes dyspnoea and suffocation. In the area of *madraul-nahar*, women used it as a drink to the children for treatment of diarrhoea and colitis. Some people say that these women used *murdarsang* in a small quantity in water for children (Baghdadi, 2005).

Kushta made up of *Murdarsang* is effective in *amraz-e-barida ratba*. It is useful in *sual, zeeq-un-nafas, aatishak, suzak, jiryan* and *fsad-e-khoon*. Its *kushta* is also used as aphrodisiac. It is antidote for *summiyat* (poisoning).

There are three (3) dosage forms of *murdarsang* mentioned in '*Miftah al-Khazain*' by Mohammad Firozuddin as under:

(a). *Salaya*

(b). *Ehraq*

(c). *Kushta* (Firozuddin, 1924)

Ibn Baitar quoted Dioscorides regarding types of *murdarsang*. It has four (4) types as follows:

(a). *Moalid neetas*: This type is made up by *maolid-e-aneetas* rage which means *resasi*. It is prepared after heating to fire.

(b). *Arkhusatas*: This is prepared by lead.

(c). *Aryuneetas*

(d). *Fleedas*: It is prepared from silver.

Another type of *Murdarsang* is mentioned as red and shiny stone which is called as *hoarsatash* means *sunahri*. It is one of the best types of *Murdarsang* which is used in this study. Ibn Baitar quoted Jalinoos regarding some facts about *Murdarsang*. It creates dryness like minerals as stones and salts (*hajri* and *arzi*), but it has less property of *mujaffif* (desiccant). It has also property of *quwwat-e-qabiz* and *jila*. It is a very effective medicine for *sahej-e-ran*. *Mom* is used as an excipient in medicines. White *Murdarsang* keeps removal of bad smell of sweating of underarms.

According to Balinas, when *Murdarsang* is dipped into *sirka* (vinegar), its *turshi* (acrid) turns into *sheerini* (sweetness), and when mixed with *chuna* (lime) applied onthe body, color of the skin is changed to black (Ibn Baitar).

As per Ishaq bin Amran, it is added in various types of *huqna* used for treatment of *is'hal*. *Murdarsang* and *kibreet* are taken in equal quantity, triturated in *sirka* and *roghan-e-aas* till it become viscous like honey, it is used in *pitti, aabl-e-jild* (Ibn Baitar).

Ibn Baitar quoted Ibn Sina that women used it in *quruh-e-ama* and *khalfa* in children. Initially, it is placed into a *kooja* (crucible) to lower down its toxic effect. It is *qabiz* and *habis-e-baul*, it produces *nafakh* in *shikam* and *halibain* (ureters). It causes *khunaq* and *tangee-e-tanaffus* (Ibn Baitar, 2003).

According to Mir Mohammad Shirazi, *Murdarsang* is made by the incineration process of *sisa, qalai* and *faulad*. It is in different colors, namely *surkh, banafsi*, or *rasasi*. Best type is of fair yellow and *baraq* color. In the procedure of *taklees*, it is made of tin, silver and gold. It is not used internally (Shirazi, ynm). *Murdarsang* is a red stone and its powder is yellowish red. It is prepared by *takhtiyo seesa* (Anonymous, 2006).

In *Zakhira Khwarzam Shahi*, it is mentioned that *Murdarsang* is effective in female diseases, such as *waram-e-rahem* and *quruh-e-rahem* (Jurjani, 1878). *Murdarsang* used in refining process of silver (Haider, 2009). It is used as a whole in the form of powder (Baghdadi, 2005; Shirazi, ynm). Specimen of *Murdarsang* is shown in figure 1. The

Mizaj (temperament) of this mineral drug described in Unani classics is Dry and weak in Hot & Cold (Baghdadi, 2005), Hot[2] and Dry[2] (Kabiruddin, 2007; Khan, 1907; Singh, 1977), Wet[3] and Dry[3] (Ghani, ynm), Hot[2] and Dry[3] (Shirazi, ynm), Hot and Dry[2] (Ahmed, 2013; Fazalullah, ynm), Hot[3] and Dry[3] (Khan, 1874). It is used in dosage four (4) *ratti*, and according to others, 1.45 gm *Murdarsang* is used for *qatil-e-kirme shikam* (Kabiruddin, 2007), 1 gm (Ghani, ynm; Khan, 1907; Fazalullah, ynm), and 500 mg (Ahmed, 2013).

Chemical description

Lead oxides also known as litharge, it is of a light yellow color mixed with red and has a metallic lustre, and is available in pieces or powder and resembles with mica in appearance (Ahmed, 2013).

Lead (ll) oxide or litharge, is a yellow oxide of lead of formula PbO, created by heating lead in air. It can also be formed by heating lead (ll) nitrate (V) (Pb (NO3)2). Litharge is amphoteric, meaning it reacts with acids to form Pb2+ and with bases to form plumbate (ll). PbO=lead (ll) oxide=Lead monoxide= CAS (Chemical Abstract Service) # 1317-36-8

Pb3O4=Lead tetraoxide=Red lead oxide= CAS# 1314-41-6

IUPAC Name: Lead (II) oxide

Physico-chemical Properties of *Murdarsang*:

Appearance : Red or Yellow powder

Atomic weight : 207.2

Chemical formula: PbO

Molar mass : 223.20 g/mol

Density : 9.53 g/cm3

Melting Point : 888 °C (1,630 °F; 1,161 K)

Boiling Point : 1,477 °C (2,691 °F; 1,750 K)

Specific Gravity : 9.53

Solubility in water: 0.017 g/L

Solubility : Insoluble in dilute alkalis, alcohol soluble in concentrated alkalis soluble in HCl, ammonium chloride (Ahmed, 2013)

Figure 1. *Murdarsang*

Chemical classification

Litharge (Lead (II) Oxide), Lead Monoxide TSCA (SARA Title III) Status:

(a). It is a poisonous yellow or reddish-yellow solid

(b). RTECS (Registry of Toxic Effects of Chemical Substances) Number : OG1750000

Litharge (Lead (II) Oxide), Lead Monoxide Chemical Abstract Service (CAS) Number: 1317-36-8

a) PbO = Lead (II) oxide = Lead monoxide = CAS# 1317-36-8

b) Pb3O4= Lead tetraoxide =Red lead oxide = CAS# 1314-41-6

Litharge (Lead (II) Oxide), Lead Monoxide EINECS (European Inventory of Existing Chemical Substances) Number: 215-267-0

Actions and therapeutic uses of murdarsang

Muhallil-e-Waram (Anti-inflammatory): Ghani, ynm; Shirazi, ynm;Krishan, ynm; Fazalullah, ynm2002; Khan, 1874

Mugharri (Emollient): Baghdadi, 2005; Shirazi, ynm

Akkal (Corrosive): Kabiruddin, 2007; Ghani, ynm; Ahmed, 2013; Fazalullah, ynm; Singh, 1977

*Qabiz(*Astringent): Baghdadi, 2005; Nadkarni,1976; Ibn Baitar, 2003; Ghani, ynm; Shirazi, ynm; Ibn Sina, 2007; Ahmed, 2013; Fazalullah,ynm; Khan, 1874

Jali (Detergent): Baghdadi, 2005; Ibn Baitar, 2003; Kabiruddin, 2007; Ghani, ynm; Shirazi, ynm; Ibn Sina, 2007; Fazalullah, ynm; Singh, 1977

Muhallil (Resolvent): Baghdadi, 2005; Shirazi, ynm

Munaqqi (Expellant): Ibn Sina, 2007

Mulatiff (Demulcent): Ibn Sina, 2007

Muhlik-e-Zahar (Antidote): Baghdadi, 2005

Musakkin: Ibn Baitar, 2003; Baghdadi, 2005; Nadkarni, 2007

Munaffis-e-Balgham (Expectorant): Kabiruddin, 2007; Ibn Sina, 2007; Krishan,ynm

Qatil-e-Kirm-e-Shikam (Antihelmintic): Kabiruddin, 2007; Ghani, ynm; Shirazi, ynm; Ahmed, 2013

Munaqqi-e-Zakhm: Shirazi, ynm; Singh, 1977

Mujafiff (Desiccant): Kabiruddin, 2007; Shirazi,ynm; Ibn Sina, 2007; Fazalullah, ynm;Khan, 1874

Laza (Irritant): Ibn Baitar, 2003

Mubarrid (Refrigerant): Nadkarni, 1976; Ibn Baitar, 2003

Insecticide: Nadkarni, 1976

Muhlik-e-Zahar (Antidote): Baghdadi, 2005

Habis (Haemostatic/ Styptic): Shirazi, ynm; Ibn Sina, 2007

Manay-e-Kasrate Tahllul wa Takkul: Baghdadi, 2005

Moallid-e-Laham Salah: Shirazi, ynm

Musaddud: Shirazi, ynm

Samm-e-Qatil (Fatal Poison): Shirazi, ynm

Mundammil/Khatim (Cicatrizant): Ahmed, 2013

Mukhrij-e-Kirm-e-Shikam (Expellent of intestinal worms): Shirazi, ynm

Therapeutic uses with their references

Amraz-e-Rahem (Uterine disorders): Tabri, 2010

Waram-e-Rahem (Metritis): Al Razi, 2001; Jurjani, 1878

Quruh-e-Rahem (Uterine ulcer): Jurjani, 1878; Anonymous, 1987

Waram-e-Unq-ur-Rahem (Cervicitis): Latafat *et al.*, 1992

Sartan (Cancer): Aslam *et al.*, 1981

Zeenat (Embellishment): Ibn Sina, 2007

Muattir (Aromatic): Baghdadi, 2005; Ghani, ynm; Shirazi,ynm

Mundamil-e-Quruh: Ibn Baitar, 2003; Shirazi, ynm; Ibn Sina, 2007

Qatay-e-Laham Jayed:Shirazi, ynm

Jarb (Scabies): Shirazi, ynm; Khan, 1874

Habis-e-Ishal (Antidiarrheal): Shirazi, ynm; Ibn Sina, 2007

Salq (Scald): Ghani, ynm; Shirazi, ynm

Nakhoona (Pterygium): Ghani,ynm; Shirazi, ynm

Khalfa: Ibn Sina, 2007

Amraz-e-chasm (Eye's disorder): Ibn Sina, 2007

Charab:Ghani, ynm; Shirazi, ynm

Kalaf (Melasma): Baghdadi, 2005; Ghani,ynm; Shirazi, ynm; Ibn Sina, 2007;Singh, 1977

Kharish (Itching):Nadkarni,2007; Baghdadi,2005; Ghani, ynm; Shirazi, ynm; IbnSina,2007; Fazalullah, ynm; Nadkarni, 2007

Amraz-e-Jild (Skin diseases): Nadkarni, 2007; Ghani, ynm; Shirazi,ynm; Krishan, ynm; Fazalullah, ynm; Nadkarni, 2007

Basoor-e-R'as: Fazalullah, ynm

Ganjpan (Baldness): Fazalullah, ynm; Nadkarni, 2007; Ghani, ynm

Amraz-e-Shikam (Intestinal disorders): Krishan, ynm

Hikka (Pruritus): Khan, 1874

Qatil-e-Joo: Ghani, ynm

Kharish-e-Ama:Baghdadi, 2005; Ghani, ynm; Fazalullah,ynm

Deedan-e-Ama (Intestinal worms): Singh, 1977

Spots of chicken pox and jhayiya: Baghdadi, 2005; Ghani, ynm; Ibn Sina, 2007; Shirazi, ynm

Is'hal (Diarrhoea): Baghdadi, 2005; Ghani, ynm; Shirazi,ynm; Fazalullah, ynm

Zakhm-e-Ama: Ghani, ynm; Shirazi, ynm

Surkh Bada:Shirazi, ynm

Sahej-e-Ama: Shirazi, ynm

Sual (Cough): Ahmed, 2013; Firozuddin, 1924

Zeeq-un-nafas (Asthma): Ahmed, 2013; Firozuddin, 1924

Quruh (Ulcer): Ahmed, 2013

Aatishak (Syphilis): Firozuddin, 1924

Suzak (Gonorrhoea): Firozuddin, 1924

Fasad-e-Khoon: Firozuddin, 1924

Jiryan (Spermatorrhoea): Firozuddin, 1924

Tiryaq (Antidote): Firozuddin, 1924

Lead Poisoining: Moknatjou *et al.*, 2012

Non-medicinal Uses

Glazing pottery, Glass flux for painting, Lead glass; Metal cement with Glycerol; Storage batteries; Ointments and Plasters; Preparing lead sub acetate solutions. Producing iridescent colours on brass and bronze; Colouring sulfur-containing substances; Pigment for rubber; Oil refining; Varnishes, Paints, and Enamels; Assays for precious metal ores.

Different formulations

(1) External Use

Marham-e-Dakhilyoon, Marham-e-Zard, Marham-e-Shingraf, Marham-e-Shifa, Marham-e Nasoor, Marham Rusal, Marham Kharish Jadeed, Marhame-Atishak,Marham Majith (Zakai, 1954; Anonymous, 2006)

Marham-e-Gulabi, Qairooti (Ahmed, 2013; Anonymous, 2006)

Qairooti Quruha Anaf (Anonymous, 2006)

(2) Internal Use

Habb-e-Leemun (Anonymous; 2016)

Kushta-e-Mudarsang, Salaya Mudarsang (Firozuddin, 1924)

Toxicity

Ibn Baitar (2003) quoted Dioscorides regarding toxicity of M*urdarsang*'s oral intake which causes severe spasmodic pain. Occasionally, intestines gain heaviness, and rupture and body gains *aamas*. Ibn Baitar mentioned Al-Razi for the management of its poisonous effects.

Physico-chemical studies

Appearance	:	Solid
Color	:	Yellowish Brown
Smell	:	Odorless

Loss in weight on drying at 1050 (%) : 0.90, 0.80, 0.90

Total ash (%)	:	7.50, 88.0, 87.50
Solubility in water (%)	:	5.00, 5.50, 5.00
Solubility in acid (1N HCl) (%)	:	9.50, 10.00, 10.00
Lead (%)	:	46.50

Clinical study

Anti-scabies study

Rahman et al. (2015) carried out a clinical study to compare the efficacy of a herbominera Unani formulation with benzyl benzoate in scabies. Litharge was also an ingredient of the composition of this Unani formulation. In the present study, 86.67 and 90 % patients were cured in the test and control group respectively. In this clinical study, no adverse effects were noted. The test formulation was as effective as benzyl benzoate in alleviating scabies. Thus, it was concluded that litharge was useful in the treatment of scabies.

Conclusion

Most of the population prefers usage of Unani medicines for their health in India. In Unani classical literature, there is vast experience-based evidence present for many of these drugs. It is widely used as a medicine especially in *marahim* (Unani ointments). Unani physicians had also described various uses of *Murdarsang* for cosmetic purpose. The drug extensively has been used for various human disorders as is evident from Unani classical literature. In current scenario scientific studies have been performed on *Murdarsang* namely, physicochemical and clinical studies. More researches can be done to exploit the unexplored potentials of *Murdarsang* which have already been mentioned in Unani classical literature.

Conflicts of interest

There is no conflict of interest.

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