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Review Article

A Comprehensive Description on Ethnopharmacology and Therapeutics of Murdarsang: A Review

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Abstract

Murdarsang is a mineral that contains pbo, or lead oxide is an important medicine in the Unani system of medicine (USM) due to its multiple therapeutic properties. It can be prepared manually with different methods and used in different forms. Etymologically, it is known as 'Litharge' 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. Throughout human history, *lead* and *lead minerals* have been used for medicinal purposes. *Galena* was used as an eye salve in *pre-dynastic Egypt*, as well as by the ancient Indian civilisations of *Mohendro-Daro* and *Harappa* between 3200 and 2800 BC. *Dioskourides* in his *De Materia Medica* says about *lithargyros* that one is made from sand called *molybditis* which is roasted until it is totally burned, another from silver, a third from lead. According to Unani system of medicine *Murdarsang* possess different properties such as Astringent, Agglutinant, mildly Detergent, Desiccant, Anti-inflammatory Refrigerant, Corrosive and Rarefying properties. It is used as a base for making ointments. It composes the drugs and reduces the intensity of their dissolution, corrosion and astringency. It also have a corrosive, Resolvent and Insecticidal action. Many pharmacological activities mentioned in Unani medicine are validated, and many activities need further exploration due to the immense therapeutic scope in this drug. The current review designed to give an overview on the historical, chemical constituents, pharmacological and therapeutic effects of *Murdarsang*.

Keywords: Murdarsang, Litharge, Lead oxide, Unani system of medicine.

INTRODUCTION:

Murdarsang is a mineral that contains pbo, or lead oxide. It's a heavy yellowish stone with a reddish tint that's been made from lead.^{1,2} It (*Plumbi oxidum*) is in odourless, tasteless, heavy yellow or reddish-yellow scales or powder, obtain by the atmospheric oxidation of molten *metallic lead*.³ It is also known as *litharge*, which is derived from Greek word 'Lithargurous' which forms as a 'Waste' during the last stage of silver smelting and it looks a lot like *mica*.^{2,4} *Dioskourides* in his *De Materia Medica* says about *lithargyros* that one is made from sand called *molybditis* which is roasted until it is totally burned, another from silver, a third from lead. There are three kinds, with Greek names meaning respectively golden (*chrysitim*), silvery (*argyritim*) and leaden (*molybditim*)⁵



Figure 1: Murdarsang ⁶

MATERIAL AND METHODS:

The literature of Murdarsang was obtained from online databases including Pub Med, Google Scholar and Web of Science etc. A library search was also conducted from classical Textbooks, and published Books. The keywords used for the search were *Murdarsang*, Litharge, Lead oxide.

SCIENTIFIC NAME: *Plumbi oxidum*^{7,8}

Mono Oxide of lead^{4,9}

IUPAC NAME: *Lead (11) oxide.*⁷

CHEMICAL COMPOSITION: *Monoxide of Lead*¹⁰

ETYMOLOGY:

Old French:	Litharge
Greek:	Lithargurous (Lithos-stone, Arguros- silver).
Latin:	Lithargyrus ^{2,7}
Ital:	Protossido di piombo
Austr, Russ and Swiss:	Plumbum Oxydatum
Belgium and Germany:	Lythargyrum
Dan, Norw and Swed:	Oxydum plumbicum
Dutch:	Oxydum plumbicum semivitreum
France:	Oxyde de plomb fondu
Jap, Mex:	Oxido de plomo
Port:	Oxydo de chumbo
US:	Plumbi Oxidum
Span:	Litargiro ³

VERNACULAR NAMES:

English:	<i>Lead oxide</i> <i>Flowers of lead.</i> ⁴ <i>Massicot</i> ^{4,10,11} <i>Litharge, Red lead</i> ^{1,10} <i>Monoxide of lead</i> ⁴ <i>Plumbi oxidum</i> ^{8,12}
Arabic:	<i>Murdosing</i> ⁴ <i>Murdasakh</i> ¹ <i>Murdasfanj</i> ⁸ <i>Murdasanj</i> ^{13,14}
Persian:	<i>Murdosing</i> ⁴ <i>Murdasang</i> ¹ <i>Murdarsang</i> ¹³ <i>Aksand asrab</i> ^{15,7,8} <i>Murdahang</i> ¹⁶
Urdu :	<i>Murdosing</i> ⁴
Unani :	<i>Labdofaros</i> ¹⁵ <i>Laidookhus, Lainukhus</i> ¹⁶
Hindi:	<i>Murdosing</i> ⁴ <i>Murdarsang</i> ^{1,8,12} <i>Murdasang</i> ¹⁴
Malayalam:	<i>Murdasinka</i> ⁴
Gujrati:	<i>Bodarakakaro</i> ⁴
Telugu:	<i>Murdarsingu</i> ⁴
Can:	<i>Mudadashringi</i> ⁴
Sanskrit:	<i>Mirdarshring</i> ¹
Stonic Name:	<i>Massicot (Monoxide of lead)</i> ¹⁶

HISTORICAL BACKGROUND:

Throughout human history, *lead* and *lead minerals* have been used for medicinal purposes. *Galena* was used as an eye salve in *pre-dynastic Egypt*, as well as by the ancient Indian civilisations of *Mohendro-Daro and Harappa* between 3200 and 2800 BC.¹⁷ Both *Dioskourides of Anazarbos* and *Pliny the Elder* mention the preparation of *lithargyros 'silver stone'* and *spuma argenti'scum of silver'* for medicinal use in the first century AD, with *Pliny* stating in his *Naturalis Historia*. It is used to make an eye-wash and for women's skin to remove ugly scars and spots, as well as a hair-wash. It has the ability to dry, soften, cool, and to act as a gentle purge, to fill up cavities caused by *ulcers* and to soften *tumours* it also removes *erysipelas* and *chilblains*.⁵ According to *Dioscorides*,

- Horisitus*: meaning of this golden, superior quality of *Murdarsang*
- Fizii*: second best quality
- Arkhoosatas*: It is a violet colour which have a prepare from *lead*
- Aryooneetas and Fluiydas*: It is prepare from *silver*
- Moalidneetas*: It is prepare from *res'as*.¹⁶

Mahiyat (Description in Unani literature):

Murdarsang is a compound (*Murakkab*) drug made by heating lead in air, which does not dissolve in water whereas diluted in nitric acid and completely dissolved in Acetic acid.^{8,14,18} It is a combination drug consisting of *lead, salt, and Sirka (vinegar)*¹³ It is also prepared artificially, which is obtained by burning of *Rang, silver and gold*. It gives red colour if it is made up of gold whereas yellowish red color when made from silver.^{19,20}

Preparation of Murdarsang:

The method of preparation is defined in classical Unani literature as follows: first, *lead* is melted, then red *lead* or burnt *lead* is added, then both are mixed in a container and concentrated *vinegar* is added until it is mixed and burnt. Separate the grains and boil them in barley water until the barley bursts and dissolves. Separate the *Murdarsang* and save it,¹⁹ another way is to split it into bean-sized bits and boil it in water in an earthenware pot with wheat and barley... After that, grind it in mortars for six days; wash it three times a day with cold... and hot water and salting it.⁵

Properties of Murdarsang:

Lead oxide (PbO), is an important semiconductor industrial material which has both forms α -PbO and β -PbO with band gap energies of 1.92eV and 2.7eV respectively, due to its unique electronic, mechanical and optical properties.²¹ Due to their unique properties, *lead oxides* have wide applications such as network-modifiers in luminescent glassy materials, pigments, gas sensors, paints, storage batteries like lead acid, valve regulated lead acid batteries and lithium secondary batteries and nanoscale electronic device.²²

Chemical Description:

It has a metallic lusture and is light yellow with red undertones, formed by heating lead in air. Heated lead (11) nitrate (v) (pb (NO3)2) can also be used to make it.² Lead oxide dissolves in Acetic acid or in diluted Nitric acid. When heated, it becomes brownish-red and fuses at a red temperature, and when heated with reducing compounds, it leaves a metallic *lead* residue.³

Physico-Chemical Properties:

- Appearance: Solid or powder
- Colour: Yellowish Brown
- Smell: Odorless
- Taste: Tasteless¹³
- Molecular formula: PbO
- Atomic weight: 207.2
- 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)
- Crystal structure: Tetragonal tp4
- Specific Gravity: 9.14-9.35.
- Lead (%): 46.50
- Insoluble: Water
- Soluble: Nitric acid, Acetic acid^{8,14}
- Solubility in water: 0.017 g/L^{2,23}

Ethno scientific Description:

Litharge is a natural mineral type of lead (11) oxide, also known as *pbo*. It is a secondary mineral that occurs when *galena ores oxidise* with an internal tetragonal crystal structure, it forms coatings and encrustations. It is dimorphous with massicot orthorhombic. PbO can be made by heating lead metal in air at around 600°C. (Lead melts at a temperature of just 300°C) At this time, at this temperature it is also the end product of oxidation of other lead oxides in air.²³ It should be kept in well-closed vessels. The U.S.P. requires that it should contain not less than 96 p.c of pure lead oxide.³

Nature:

Litharge is a burnt form of lead. Sometimes it is made of other materials also. Measures used to improve its quality include:

- Boiling in *vinegar* or wine
- Burning once or twice on live-coal and collecting the supernatant
- Boiling with wheat or barley in water.
- The procedure is repeated several times followed by cleansing with salt.²⁴

PHARMACOLOGICAL ACTIONS:

Actions of *Murdarsang* are an Astringent, Agglutinant, mildly Detergent, Desiccant, Refrigerant, Corrosive and Rarefying properties. It is used as a base for making ointments. It composes the drugs and reduces the intensity of their dissolution, corrosion and astringency. It also have a corrosive, Resolvent and Insecticidal action.^{2,4,24}

Mizaj (Temperament):

It's having hot and dry (*Har Yabis*) temperament but according to degree of dryness there are two types;

- *Hotness and Dryness* of 2nd degree^{12,14,20}
- *Hotness and Dryness* of 3rd degree^{8,25}

- *Maghsool Murdarsang* (when treated with water) having 1st degree *coldness* and 3rd degree *dryness*.^{13,15}

Nafaa Khaas (Special Function):

- *Munaqqi-e-Zakhm* (Wound cleaner)²⁵
- *Muhallil-e-Waram* (Anti-inflammatory)
- *Mujaffif Qurooh* (Desiccant)^{1,8,13,14,15,26}
- *Qatil-e-kirm Shikm* (Vermicide)²⁶

Af'aaal (Actions):

In classical Unani literature there are different kinds of actions are mentioned

- *Jali* (Detergent),^{8,13,15,19} *Mujaffif-i-Qurooh* (Desiccative),^{1,12,13,15,19,27} *Muhallilauram* (Antiinflammatory),^{13,15,19} *Mugharri* (Emollient)^{15,28} *Mubarrid* (Refrigerant),^{4,16} *Musakkin* (Analgesic)^{4,19,16} *Mundammil/Khatim* (Cicatrizant)^{13,15} *Akkal* (Corrosiv),^{1,8} *Habis* (Haemostatic),^{15,19} *Qabid* (Astringent),^{15,19} *Munaffis-e-Balgham*,¹ *Munbit-e-laham*^{15,19} *Ra'ada* (Repellent), *Munaqqi Zakhm*,¹⁵ *Qa'atilededan-e-ama'a*^{1,8,12,15} *Mulatiff* (Demulcent),²⁹ *Muhlik-e-Zahar* (Antidote), *Musawwid-e-sha'r* (Black hair dyer),¹⁴ *Dafaa Ganj*^{14,15}

Istema'al (Ethno medicinal Uses):

Murdarsang used externally in the form of an ointment/powder/ plaser/ medicated oil for the following conditions like,

➤ **Tazeeniyat (Cosmetics):**

For *Muattir* (Aromatic) purpose white *Murdarsang* eliminates bad odour from the axilla and provides a fragrant odour in the body (it should be used in combination with *Roghan gul* and helps to prevent excessive sweating).^{12,15,16,28}

- Depilatory and hair dye³⁰
- Clear the freckles, black marks and hematoma
- Removes the marks of small pox
- Prevents the abrasion of thighs²⁴

➤ **Mundamil-e-Quruh (Wound healing):**

It granulates the ulcers across their width. Its paste is a useful application for unhealthy ulcers and protective effect on inflamed parts. *Murdarsang* plaster called lead plaster or litharge plaster is used to prevent bed sores, as a protective to wounds and ulcers.^{4,24} It aids in the removal of slough by making a fine powder of only one *Murdarsang* or mixing it with other suitable medicine and using it as a *Zaroor* or dusting on wounds, particularly those that are putrefied and foul smelling.^{14,18,28}

➤ **Qatay-e-Laham Jayed (Reduction in overgrowth tissue)**➤ **Amraz-e- Am'a (Intestinal diseases):**

- For *diarrhoeal* treatment, some people use *Murdarsang* in an *enema*. It was once used as a drink to treat diarrhoea and intestinal ulcers^{15,16} and colitis treatment in children.
- *Deedan-e-Ama* (Intestinal worm) - Take 1.75gm white *Murdarsang* with *jilaab* for worm.^{13,14}
- *Is'hal* (Diarrhoea)¹⁹
- *Kharish-e-Ama*^{14,19}

- *Habis-e-Ishal* (Antidiarrhoeal) ^{13,19}
- *Zakhm-e-Ama* ¹³

➤ **Amraz-e-Jild (Skin diseases):**

Murdarsang dissolved in vinegar or in rosewater it is soothing effect in prickly heat, eczematous eruptions and in removing freckles and acne.⁴ Its paste is beneficial in *jarb* (scabies), *hikka* (pruritus),^{16,19}, *kalaf* (melasma), ecchymosis,¹³ abrasion on axilla and groin region^{19,28} and removes freckles, acne and smallpox marks. Its paste mixed with *Roghan* and apply on cracked skin (*shiqaqe jild*)^{13,15,19}

➤ **Amraz-e-Aza-e-Tanasilya (Reproductive diseases):**

According to *Zakhira Khwarzam Shahi*, *Murdarsang* is successful in certain male genital diseases, such as penile ulcers and testicular ulcers, an ointment composed of oxide of lead 3 part, *Rasakapur* 1, *Tamarix orientalis* 2, Simple oil 5 and *Wax* 5 parts is a useful application to syphilitic chancres.⁴

- *Waram-e-rahem* (Metritis)
- *Quruh-e-rahem* (Uterine ulcer)
- *Waram-e-Unq-ur-Rahem* (Cervicitis)
- *Sartan-e-Unq-ur-Rahem* (Cervical cancer)^{31,32}

➤ **Amraz-e-Sha'ar (Hair diseases):**

- *Qatil-e-Joo* - *Murdarsang* mixed in *Sirka*, *Roghan zaitoon* and apply on head lice.^{15,16,19}
- Black hair dyer- Its paste mixed with lime work to go hair dyer ¹³
- *Ganjpan* ¹⁹
- *Basoor-e-Ra'as* ¹⁹

➤ **Amraz-e-Aain (Ophthalmic diseases):**

- White *Maghsool Murdarsang* is used as *surma (kajal)* and clean eye ²⁸
- *Nakhoona* (Pterygium)
- *Jarb* (Trachoma)
- *Salaaq* (Blepharitis)
- *Qurooh-e-chasm* ^{13,19}

Others Uses:

- **Scald and burn** - *Murdarsang*, *dry hina*, *kameela* and washed *ghee* is also beneficial in scald and having very soothing effect in burn cases.^{15,16,19}
- **Urticaria and boil** - Take equal quantity of *Murdarsang*, *sulphur (kibreet)* and make fine powder with in *Sirka* and *Roghan Aas* till it become viscous like honey then apply locally.^{15,16}
- *Kushta Murdarsang* is effective in *Amraz-e-barida ratba* like *Sual* (cough), *Zeeq-un-nafas* (asthma)¹ *Aatishak* (syphilis), *Suzak* (gonorrhoea), *Jiryana* (spermatorrhoea), *Fsad-e-khoon* and its also work as antidote for *tiryaaq*.²
- *Surkhbadah* (Erysipelas)⁵
- *Chilblains* ⁵
- *Arq Madani* (Drunculosis)¹⁹
- Some Unani preparations of lead are claimed to possess Antispasmodic, Anticancer and Seminal stimulant properties.³⁰

Miqdare Khorak (dosage):

There are different doses of *Murdarsang* mentioned in Classical Unani textbooks.

- 1 *Masha* ^{19,20}
- ½ gm – For general use
- 2000mg- For Intestinal worm¹
- 4 *Rati* ^{12,26}
- 1-2 *Rati* ²⁷
- On Wound/Ulcer- As per need.¹⁸

Muzir (Adverse effects):

- When it takes orally, causes dysuria, it stops the urine and inflates the bowels as also areas pertaining to ureters. It whitens and convulsion¹⁵ in the tongue and also causes dyspnoea and asphyxia.^{15,24,28} It specially effect the intestine ¹⁹ and produces heaviness¹⁶ flatulence,¹⁵ colitis,⁸ tenesmus and retention of urine^{18,25,26} but sometimes intestinal perforation occur.^{1,12,13,15} It causes fatalic when intake orally 7 *masha*.²⁰

Fatal Dose: 7 *Masha*²⁰

Musleh (Correctives):

- In classical Unani literature there are various Correctives mentioned which reduce the adverse effects of *Murdarsang* by *Sirka khalis*, *Roghan badam*, *fatty oil (yakhini)*, fresh milk^{15,19,26} black wine, ghee ^{1,8,12,13,14,16,18,20,25}
- According to Unani physician rice plant and its leaf are Correctives for *Murdarsang*^{15,19} and trying for sweating and vomiting.¹⁶

Badal (substitutes):

- *Safaida Kashgiri* (white lead) ^{1,8,12,13,14,18,26}
- *Zast/ Silver crystalline (Aqlimia-e-fiza)*^{13,20}
- *Sindur* (Red lead oxide)¹⁹
- *Saliqoon* ¹⁵

Traditional Uses:

- It has possibly been used as a common medicine in the *Arabian Gulf for centuries*. It is provided to newborns and small children to help with meconium and stomach problems.¹⁷

Murakkabat (Important Compounds):

➤ **Orally:**

- *Habb-e-Leemun*,³³
- *Kushta-e-Mudarsang*,
- *Salaya Mudarsang*,
- *Hab-e-Surkhbadah* ¹⁸
- *Hab Qoobah*.^{18,33,34}
- *Safoof Kharish*.¹¹

➤ **Locally:**

- *Marham Dakhliyon*³⁵,
- *Marham Gulabi*^{9,18,19}
- *Marham-e-Zard*,
- *Marham khanazeer*,
- *Marham Rusal*,
- *Marhame Atishak*,
- *Marham Nasoor*,
- *Marham-e-Shingraf*,
- *Marham-e-Shifa*,
- *Marham-e-Nasoor*,
- *Marham Kharish Jadeed*,
- *Marham Majith*,
- *Qairooti*^{1,7,19,33,34}

Evidence Based Pharmacological Activities:

- *Murdarsang*, *Safeda kashghari*, and *Roghan gul* as tampon with *Anzaroot* and *Mom-e-Zard* in chronic cervicitis were found to have anti-inflammatory, anti-septic, healing, analgesic, and resolvent effects in a clinical trial.³⁶
- Anti-bacterial Activity: Antibacterial activity of lead oxide nanoparticles against two different types of bacteria; Gram-negative bacteria (*Escherichia coli*) and Gram-positive bacteria (*Staphylococcus aureus*) strains by diffusion method that locally kill bacteria or slowdown.²¹
- Anti-Scabies study: A study revealed that *Zimad-e-Jarb* is effective in *Jarb* in terms of itching, erythema, papules and number of lesions due to *Jali* and *Muhallil* properties of *Murdarsang* that helps remove the morbid matter from the affected area. Also the *Muhallil* and *Mundamil-e-Qurooh* properties of *kameela* and *Murdarsang* help in healing of lesions, and due to *Musakkin* and *Mubarrid* actions of *Murdarsang* itching is reduced.³⁷
- A clinical study of Unani formulation, *Murdarsang*, *Safeda kashghari*, *Roghan gul* on *Sheqaq-al-maq'ad*, revealed significant relief in pain due to *Musakkin* and *Muhallil-e-Awram* properties of *Murdarsang* and also relief in other symptoms and itching is because of *Mujaffif-i-Qurooh*, *Munaqqi-i-Zakhm*, *Munbit-i-Laham*, *Mudammil-e-Qurooh* and *Mubarrid* functions of *Murdarsang*.³⁸

DISCUSSION AND CONCLUSION:

Murdarsang is one of the important mineral drug which has been used since prehistoric period for the cure of various diseases. It possess *Jali* (Detergent), *Akkal* (Corrosive), *Qabiz* (Astringent), *Habis* (Haemostatic), *Mundammil/Khatim* (Cicatrizant), *Muhallil-i-auram* (Anti-inflammatory) *Mujaffif-i-Qurooh* (Desiccative), *Munaffis balgham* (Expectorant), *Ra'ade* (Repellent), *Qatil-i-kirm shikam* (Anthelmintic), *Muhlik-e-Zahar* (Antidote), *Munbit-e-Sha'r* (Hair grower), and *Musawwid-e-sha'r* (Black hair dyer) etc. Unani physicians had also described various uses of *Murdarsang* for cosmetic purpose. The review explores *Murdarsang*'s pharmacological and therapeutic properties and clearly revealed immense beneficial pharmacological activities in the drug.

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