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 'lithargyros' (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 civilizations of Mohenjodaro and Harappa between 3200 and 2800 BC. Dioskurides in his De Materia Medica says about lithargyros that one is made from sand called molybditidis 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 properties. 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 ‘Lithargyros’ which forms as a ‘Waste’ during the last stage of silver smelting and it looks a lot like mica.2,4 Dioskurides in his De Materia Medica says about lithargyros that one is made from sand called molybditidis 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: \textit{Plumbi oxidum}^{28}

\textit{Mono Oxide of lead}^{4,9}

IUPAC NAME: Lead (11) oxide.\textsuperscript{77}

CHEMICAL COMPOSITION: \textit{Monoxide of Lead}\textsuperscript{10}

ETYMOLOGY:

| Old French:             | Litharge                              |
|------------------------|---------------------------------------|
| Greek:                 | Lithargurous (Lithos-stone, Arguros- silver). |
| Latin:                 | Lithargyros \textsuperscript{2,7}      |
| Ital:                  | Protossidio di piombo                 |
| Austr, Russ and Swiss: | Plumbum Oxidatum                      |
| Belgium and Germany:   | Lithargyrum                           |
| Dan, Norw and Swed:    | Oxidum plumbicum                     |
| Dutch:                 | Oxidum plumbicum semivitreum          |
| France:                | Oxide de plomb fondu                  |
| Jap, Mex:              | Oxido de plomo                        |
| Port:                  | Oxido de chumbo                       |
| US:                    | Plumbi Oxidum                         |
| Span:                  | Litarqirio \textsuperscript{3}        |

VERNACULAR NAMES:

| English:     | Lead oxide                              |
|--------------|-----------------------------------------|
|             | Flowers of lead\textsuperscript{4}      |
|             | Massic\textsuperscript{2,10,11}         |
|             | Litharge, Red lead\textsuperscript{1,10}|
|             | Monoxide of lead\textsuperscript{4}     |
|             | Plumbi oxidum\textsuperscript{8,12}     |

| Arabic:      | Murdosing\textsuperscript{4}           |
|--------------|----------------------------------------|
|             | Murdasakh\textsuperscript{1}           |
|             | Murdasfanji\textsuperscript{8}         |
|             | Murdasang\textsuperscript{13,14}       |

| Persian:     | Murdosing\textsuperscript{4}           |
|--------------|----------------------------------------|
|             | Murdusang\textsuperscript{1}           |
|             | Murdusang\textsuperscript{13}          |
|             | Aksand asrab\textsuperscript{15,7,8}   |
|             | Murdahang\textsuperscript{16}          |

| Urdu:        | Murdosing\textsuperscript{4}           |
|--------------|----------------------------------------|
|             | Labdofaroos\textsuperscript{15}        |
|             | Laidookhus, Lainukhus\textsuperscript{16}|

| Hindi:       | Murdosing\textsuperscript{4}           |
|--------------|----------------------------------------|
|             | Murdusang\textsuperscript{1,8,12}      |
|             | Murdusang\textsuperscript{14}          |

| Malayalam:   | Murdasinka\textsuperscript{4}          |
|--------------|----------------------------------------|
| Gujrati:     | Bodarakakaro\textsuperscript{4}        |
| Telugu:      | Murdarsingu\textsuperscript{4}         |
| Can:         | Mudadashringi\textsuperscript{4}       |
| Sanskrit:    | Mirdarshring\textsuperscript{1}        |
| Stonic Name: | Massicot (Monoxide of lead)\textsuperscript{16} |

HISTORICAL BACKGROUND:
Throughout human history, lead and lead minerals have been used for medicinal purposes. Galen 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.\textsuperscript{17} Both Dioskourides of Anazarbos and Pliny the Elder mention the preparation of lithargyros 'silver stone' and spuma argent'i'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 chillblains.\textsuperscript{5} According to Dioscorides,

a) Horisitus: meaning of this golden,superior quality of Murdarsang

b) Fitzii: second best quality

c) Arkhoosasas: It is a violet colour which have a prepare from lead

d) Aryoonaetas and Fluivdya: It is prepare from silver

e) Moalideenetas:It is prepare from res'as.\textsuperscript{16}

Mahiyat (Description in Unani literature):

Murdarsang is a compound (Murakkah) drug made by heating lead in air, which does not dissolve in water whereas diluted in nitric acid and completely dissolved in Acetic acid.\textsuperscript{8,14,18} It is a combination drug consisting of lead, salt, and Sirka (vinegar)\textsuperscript{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.\textsuperscript{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,\textsuperscript{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.\textsuperscript{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.\textsuperscript{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.\textsuperscript{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.\textsuperscript{3} Lead oxide dissolves in Acetic acid 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.\textsuperscript{3}
Physico-Chemical Properties:
- Appearance: Solid or powder
- Colour: Yellowish Brown
- Smell: Odorless
- Taste: Tasteless
- 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
- Solubility in water: 0.017 g/L

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 massicots orthorhombic. PbO can be made by heating lead metal in air at around 600°C. At this time, at this temperature it is dimorphous with massicots orthorhombic. 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.

PHARMACOLOGICAL ACTIONS:
Actions of Murdarsang are an Astringent, Agghituant, 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 properties. It aids in the resolution, corrosion and astrigency. It also have a corrosive, Resolvent and Insecticidal action.

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
- Hotness and Dryness of 3rd degree

- Mintsool Murdarsang (when treated with water) having 1st degree coldness and 3rd degree dryness.

Nafaa Khaas (Special Function):
- Munaqi-e-Zakhm (Wound cleaner)
- Muhalil-e-Waram (Anti-inflammatory)
- Mujaffi Quoroh (Desiccant)
- Qatiil-e-kirm Shikhm (Vermicide)

Af‘al (Actions):
In classical Unani literature there are different kinds of actions are mentioned.
- Jali (Detergent)
- Muhalil-i-Quruh (Desiccative)
- Munaqqui (Black hair dyer)
- Mubarrid (Haemostatic)
- Musakkin (Analgesic)
- Mundammil/Khatim (Cicatrizant)
- Habis (Haemostatic)
- Qabid (Astringent)
- Munafis-e-Balgham
- Ra‘aida (Repellent)
- Munaqqui Zakhm
- Qa‘atilededean-e-ama‘a
- Mulatif (Demulcent)
- Muhlik-e-Zahar (Antidote)

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).
- Mundamil-e-Quruh (Wound healing):
It granulates the ulcers across their width and intestinal ulcers and protective to wounds and ulcers.
- Qaty-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 and colitis treatment in children.
• Habis-e-Ishal (Antidiarrhoeal) 13,19
• Zakhm-e-Ama 13

➢ Amraz-e-Fild (Skin diseases):

Murdersang dissolved in vinegar or in rosewater it is soothing effect in prickly heat, eczematous eruptions and in removing freckles and acne. Its paste is beneficial in jarb (scabies), hikka (pruritus),16,19, kalaf (melasma), eczemyosis, abrasion on axilla and groin region19,20 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-Tanasiyla (Reproductive diseases):

According to Zakhira Khwarzam Shahi, Murdersang 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, Tamartix orientalis 2, Simple oil 5 and Wax 5 parts is a useful application to syphilitic chances.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 - Murdersang mixed in Sirka, Roghan zaitoon and apply on head lice.15,16,19
• Black hair dyeer- Its paste mixed with lime work to go hair dye 13
• Ganipan 19
• Basoor-e-Ra’as 19

➢ Amraz-e-Aain (Ophthalamic diseases):

• White Maghsool Murdersang is used as surma (kajal) and clean eye 28
• Nakhonna (Pterygium)
• Jarb (Trachoma)
• Salaq (Blepharitis)
• Qurooh-e-chasm 13,19

Others Uses:

➢ Scald and burn - Murdersang, dry hina, kameela and washed ghoo is also beneficial in scald and having very soothing effect in burn cases.15,16,19

➢ Urticaria and boil - Take equal quantity of Murdersang, sulphur (kibreet) and make fine powder with in Sirka and Roghan Aas till it become viscous like honey then apply locally.15,16

➢ Kashtha Murdersang is effective in Amraz-e-barida ratba like Suail (cough), Zeeq-un-nafas (asthma)1 Aatishak (syphilis), Suzak (gonorrhea), Jiryan (spermatorrhoea), Fasad-e-khoon and its also work as antidote for tiryaq.2

➢ Surkhbadah (Erysipelas)5
➢ Chilblains 5
➢ Arq Madani (Dranculusio)19

➢ Some Unani preparations of lead are claimed to possess Antispasmodic, Anticancer and Seminal stimulant properties.30

Miqdare Khork (dosage):

There are different doses of Murdersang mentioned in Classical Unani textbooks.

- 1 Masha 19,20
- ½ gm - For general use
- 2000mg- For Intestinal worm
- 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 urine10,25,26 but sometimes intestinal perforation occur.1,12,13,15 It causes fatalic when intake orally 7 masha.20

Fatal Dose: 7 Masha20

Muslekh (Correctives):

➢ In classical Unani literature there are various Correctives mentioned which reduce the adverse effects of Murdersang by Sirka khalis, Roghan badam, fatty oil (yakhini), fresh milk13,19,26 black wine, ghee 1,8,12,13,14,18,18,20,25

➢ According to Unani physician rice plant and its leaf are Correctives for Murdersang15,19 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

Murakabat (Important Compounds):

➢ Orally:
  • Habb-e-Leemun,33
  • Kushtha-e-Mudarsang,
  • Salaya Mudarsang,
  • Hab-e-Surkhbadah 18
  • Hab Qoobah,18,33,34
  • Safoof Kharish,11
Evidence Based Pharmacological Activities:

- Murdarsang, Safeda kashghari, and Roghan gul as tampon with Anzaraat 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 aurous) strains by diffusion method that locally kill bacteria or slowdown.21

- Anti-Scabies study: A study revealed that Zimid-e-Jarbah is effective in Jarbah in terms of itching, erythema, papules and number of lesions due to Jali and Muhallili properties of Murdarsang that helps remove the morbid matter from the affected area. Also the Muhallili and Mundamil-e-Qaroooh properties of kameela and Murdarsang help in healing of lesions, and due to Musakkin and Mumbrid actions of Murdarsang itching is reduced.37

- A clinical study of Unani formulation, Murdarsang, Safeda kashghari, Roghan gul on Sheeqq-al-maqad, revealed significant relief in pain due to Musakkin and Muhallili-e-Awram properties of Murdarsang and also relief in other symptoms and itching is because of Mujaffifi-e-Qaroooh, Munnaqqi-i-Zakhm, Munbit-i-Laham, Mundammil-e-Qaroooh and Mumbrid 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 possesses Jali (Detergent), Akkal (Corrosive), Qabiz (Astringent), Habis (Haemostatic), Mundammil/Khatim (Cicatrizing), Muhallili-i-awram (Anti-inflammatory) Mujaffifi-i-Qaroooh (Desiccative), Munafis balgham (Expectorant), Raade (Repellent), Qatii-i-kirm shikam (Antihelminthic), Muhlik-e-Zabhar (Antidot), Munbit-e-Sha’r (Hair grower), and Musawwivid-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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