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"Toxicity Of Heavy Metals In Context With *Ashuddha Bhasmas* And Review Of Arsenic"

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ABSTRACT –

The well-known metal mostly used in *Ayurveda* include Hg, As, Ag, Cu, Pb, tin etc. These metals have specific gravity more than 5. Hence these are categories in group of heavy metals. *Bhasmas* are unique *Ayurvedic* metallic preparations with herbal juices and fruits widely used for treatment of variety of chronic aliment. The *Bhasmas* are products of classical alchemy oregano metallic compounds of certain metals and gems in a very fine powdered form mostly oxides made in elaborate incineration processes perfected several centuries ago. Hence importance of classical *Bhasmas Pareeksha* like *Rekhapurnatwa*, *Nishchandratwa* etc. is justified. Improper incineration gives *Ashuddha Bhasma* which contains toxicity and due to which complications arises. A comparative similar thing could be observed between heavy metals and *Ashuddha Bhasmas*. The arsenical compounds are intentionally added to the *Ayurvedic* formulation as main active ingredients or as axillary agent to assist the efficacy of herbal drugs. So review of arsenic discussed here.

Key words – Toxicity, heavy metal, *Ashuddha Bhasma*, Arsenic.

INTRODUCTION:-

The Pharmacological Section of *Ayurvedic* system of medicine recognizes 3 major sources of medicine , those of herbalorigin mineral origin (eg. salts, metals like gold, copper, silver) and animal origin (eg. Milk, honey etc.). Although *Kashthaushadhi and Rasaaushadi* are two main groups of medicine the farmer is devoid of any metals and minerals and is purely herbal product can be consider of metals and minerals in the form of *Bhasma* (incinerated metals and minerals etc.) The well-known metal mostly use *in Ayurveda* include Hg, Au, Ag, Cu, As, lead, tin, etc. These metals have specific gravity more than 5 hence these are categorized in group of heavy metal *Bhasmas* are unique *Ayurvedic* metallic preparation with herbal juices widely used for treatments of diseases. [1]

The *Bhasmas* are products of classical alchemy organic – metallic compounds of certain metal and gems in a very fine powdered form mostly oxides, made in elaborate incineration processes perfected several centuries ago Now a day's some people who are unaware of the pharmaceutical processing *of Rasaushadis* are in doubt about their toxicity.

Recent articles pertaining the alarming level of heavy metals especially Pb, Hg & As in *Ayurvedic* formulations have created a lots of controversy regarding the safety efficacy of *Ayurvedic* formulations. It same context ,lead, Hg & As have been detected in a substantial proportion of Indian manufactured traditional *Ayurvedic* medicines are unknown, hence an attempt was made to study comparative things or the facts of heavy metal poisoning &*Ashuddha Bhasmas Sevan Doshas*. Arsenic is a naturally occurring element that is widely distributed on earth crust. It is classified chemically as a metalloid having both properties of metal and nonmetal however it is frequently referred as metal. The arsenical compounds are intentionally added to the Ayurvedic formulations as main active ingredients or as auxiliary agents to assist the efficacy of herbal drugs. Many toxic metals are used in *Ayurveda* after *Shodhana* purification and *Marana* calcination. It is a process to convert Inorganic materials to organic compound for better absorption, assimilation, reduce toxicity and to enhance the medicinal properties

Aim:

Conceptual study of Toxicity of metals in context with *Ashuddha Bhasama sevan dosha* and review of Arsenic.

Objectives:

1) To review modern concept of Toxicity of metals.

2) To review *Ashuddha Bhasama sevan dosha*.

3) To review of Arsenic

Methodology:

Toxicity:

The Branch of science which deals with the study of poisons in references to their source , character properties , mechanism of action, sign / symptoms, lethal dose , cause of death ,Rx , detection & estimation & postmortem findings. Toxicity is the degree to which substance can damage an organism. This can affect a whole organism or structure like cell (cytotoxicity) or an organ (Hepatotoxicity)[2,3].

a) Classification based an Action[4]

- Corrosives
- Irritants
- Neurotoxic
- Cardiac
- Respiratory
- Miscellaneous.

*** Table no. 1- Irritants toxicity**

Non Metals	Metals
Phosphorous Boron, Fluorine ,Chlorine, Bromine, Iodine	Arsenic , Lead , Mercury , Copper , Ferrous , Zinc , Magnesium , Manganese ,

Heavy metals

These are essentially those chemical elements that have a specific gravity. Which is five times that of water. These are mast often found to be responsible for harmful damage to humans in cases leading to environmental pollution from various sources are Hg ,As, Pb, Cd, thallium. Heavy metal toxicity refers to the excessive buildup of heavy material in the body. Since body cannot degrade them, they gate accumulated in a body tissues and interfere in the healthy functioning of system and may results in disease like a neurological, degenerative processes, Parkinsonism disease muscular dystrophy, multiple sclerosis etc. Toxicity of metals are listed here according to WHO the metals of most immediate concern internationally are aluminum, chromium, manganese, iron, cobalt, copper, cadmium, mercury, lead , arsenic (WHO 1984). Out of these 106 identified elements, 80 of them are called metals. Metals are divided in two groups that are essential and non-essential. Essential are used for survival and non-essential are toxics.[5,6]

Factors influencing toxicity

1) Path of administration (skin, inhaled, ingested, injected).

2) Time of exposure.

3) The no. of exposure (single dose or multiple doses).

4) The physical form of toxin (Solid, liquid, gas).

5) The genetic makeup of an individual.

6) Individual's overall health and many others.

Based on a time of an exposure it can be-

A) Acute exposure – A single exposure to a toxic substance which may result in severe biological harm or death.

B) Chronic exposure – Continuous exposure to toxin over an extended period of time; often measured in months of years.

Table no. 2 – Metals and it's Acute and Chronic toxicity

Metals[7]	**Compounds**	**Acute**	**Chronic**
Mercury[8]	Mercuric chloride (Corrosive sublimate), Mercuric cyanide, Mercurous oxide (Rasakapoor), Mercuric oxide (Sipichand), Mercuric nitrate, Mercuric Sulphate, Murcuric methide, Mercuric sulphide (China sindur)	Pain and feeling of constriction in mouth and upper GIT, fatigue, depression, headache, vomiting, profuse bloody diarrhea, convulsion.	Pulmonary edema, pneumonia, ataxia, arthralgia, fibrosis, delirium, polyneuropathy, sensory impairments.
Copper[9]	Copper sulphides, Copper carbonates, Copper oxide	salivation ,Vomiting , Burning pain in upper GIT ,thirst , nausea , diarrhea , hematuria , albuminuria , jaundice , muscular cramp convulsions.	Green purple line on the gum , Nausea, giddiness ,headache, colicky pain , conjunctivitis laryngitis, bronchitis , nephrotoxicity, neuritis, dermatitis, anemia
Gold	Au with Tellurium as the minerals calaverite, krennerite, nagyagite, petzite & sylvanite, Bismuthide maldonite (Au_2Bi) Amtimonide aurostibite ($AuSb_2$) Auricupride (Cu_3Au) Novodneprite ($AuPb_3$) Weishanite ($(Au, Ag)_3Hg_2$)	Nausea, giddiness ,headache, colicky pain , conjunctivitis, dermatitis, pruritus , urticarial etc.	Generalized continuous fine vibrating muscles movements, bone marrow depression stomach and intestinal bleeding
Arsenic[10]	Arsenic trioxide –	Headache,	Weakness , muscle

	Sankhya Arsenic trisulphide-Harital Arsenic bisulphide-Realgar Potassium arsenite, Aecenic acid Sodium arsenite Copper aecenit Copper asito arcenite	drowsiness, confusion, seizures, peripheral, neuropathy, demyelination, edema, vomiting, pain, fever, diarrhea, hemolysis, anemia, hypotension.	aches, chills, fever, hyperkeratosis, hyperpigmentation, polyneuritis,
Lead [11]	Lead tetroxide-sindoor Lead acetate-salt of Saturn Lead sub-acetate, Lead iodide Lead carbonate-safeda Lead nitrate, Lead bromide Lead sulphate, Lead chloride Lead chromate – chrome yellow Lead sulphide-surma Tetra – itthaial lead	Vomiting, colic pain, constipation, weakness, anemia, wrist drop, kidney disease.	Hypochromic anemia , lead palsy , encephalopathy, level of lead in blood elevation of free erythrocyte, retinal steeping sterility, hair alopecia.
Silver	Agrentite (Ag_2S), Cerargyrite (AgCl) Polybasite ($Ag_{16}Sb_2S_{11}$), Proustite (Ag_3AsS_3), Pyrargyrite (Ag_3SbS_3)	Gastro intestinal, Renal, Neurological symptoms, Headaches, Irritability, Psychosis, Stupor, Coma and Convulsions these common symptoms will be manifested	Gray discoloration of skin, hair and internal organs.
Tin	Cassiterite(SnO_2), Stannite, Teallite Cylindrite, Franckeite, Canfielidite ,		Damage nervous system, psychomotor disturbances, convulsions, Hallucination and psychotic behavior.
Zinc	Zinc sulphide (ZnS) Zinc oxide (ZnO) Zinc carbonate ($ZnCO_3$) Zinc silicate		Metal fume disease or liver dysfunction.

*** Table no. 3 –*Ashuddhabhasma janya vikara andApakwabhasma janya vikara***

Bhasma sevana	**Compounds**	***Ashuddha bhasma janya vikara.***	***Apakwabhasma janya vikara.***
Parada [13]	Mercuric chloride	*Bhumija-Kushtha*	

	(Corrosive sublimate) Mercurous oxide (Ras kapoor) Mercuric oxide (Sipichand) Mercuric cyanide, Murcuric methide Mercuric nitrate Mercuric sulphate, Mercuric sulphide (China sindur)	*Girija-Jadyata Jalaja-Vataroga Nagaja-Unmade Vangaja-Mahashularoga Tamra-Daha Loha-Kantaroga.*	
Abhrak	Biotite - Black mica, Lepidolite – Ruby mica Muscovite – White mica (Potash) Phlogopite – Magnesium mica Paragonite – White mica	*Kushtha, Ksaya Roga, Pandu roga, Sotha, Pain in cardiac region & flanks, loss of appetite, Guru for digestion.*	*Poison, Vajra, Sastra agni Prmeha Roga, Chandrika Yukta Bhasmase mrityu.*
Maksika	Chalcopyrite (Swarn) - $CuFeS_2$ Iron Pyrite (Rajata) - FeS_2	*Andhatwa Kustha roga, Ksaya roga, Krmi roga, Mandagni, Nirbalta, Gandamala, Vrana, Gatraruka*	*Aneka prakara kushta, Mrityu.*
Shilajatu	*Gomutragandhi* – Blackbitumen *Karpurgandhi* – Potassium nitrate	*Daha, murcha, bhrma, rakta pitta, kshaya, agnimandya & vibhanda*	
Tutthha	Copper sulphate - $CuSO_4$	*Vaman, Bhrama, Garavisaghna, Vishaghna*	
Rasaka	Zinc oxide – ZnO	*Bhrama, Vami*	
Gandhaka	Copper Pyrite, Iron Pyrite, Copper Sulphate, Ferrous Sulphate, Galena (Nilanjana), Galena (Nilanjana), Zinc Sulphate (Yashada), Antimony Sulphide (Srotonjana), Orpiment (Haratala), Realgar (Manasila), Cinnabar - Hingula	*Mandagani, Ksudra kustha, Kasa (cough), Swasa (Dyspnoea), Wild fire, Dadrurog a (Skin disease), Ama Dosha*	*Kushta, Jwara, Bhrama, Pittaroga, Rupa, Veerya balanasha, tapa, raktavikriti*
Harit	Arsenic trisulfide	*Ayunashta, Mrityu, kapha*	*Vata kapha prakop*

ala	As_2S_3	*roga, Vata roga, jwara, Daha, Sphota, Snaayu sankocha/ Anga sankocha, Kushta, Rakta dushti, Kshoba, Kampa, Toda*	*a, kushta, Tapa, Anga Sankoc ha, Sruja*
Mana hshil a	Arsenicdis ulfide As_2S_2	*Ashmari, Hridroga Shareera & twacha sundarta nashta, Balhani Mandagni , Malaband ha, Mutra roga/ mutra krichra*	
Hing ula	Sulphide of Hg red in colour HgS (Hg86.2%, S 13.5%)	*Ksheena, Klama Klaibya, Moha , Prameha roga, Andhatwa , Bhramas*	
Swar na	Au with Tellurium as the minerals calaverite, krennerite, nagyagite, petzite & sylvanite, Bismuthid e	*Bala veeryanas ha, Dukha, Giri bhava, Roga samudaya , Asoukyey a, Marana*	*Asouky eya veerya bala hani*
	maldonite (Au_2Bi) Amtimoni de aurostibite ($AuSb_2$) Auricuprid e (Cu_3Au) Novodnep rite ($AuPb_3$) Weishanit e ($(Au, Ag)_3Hg_2$)		
Rajat a	Mukta rajata (Native silver), Pyrargyrit e(Ag_3SbS_3) Khanija or Yougika rajata Agrentite (Ag_2S), Polybasite ($Ag_{16}Sb_2S_{11}$) Cerargyrit e (AgCl), Proustite (Ag_3AsS_3)	*Pandu ,kandu, Galagrah a, Malaband ha, Veeryanas ha , balahaani ,Shiroruja , Veerya nasha, Nanaroga utpanna, Tapa,Tan usada*	*Ayu veerya bala haani,T apa, vidband ha, Rogakri t*
Lauh a	Munda loha – cast iron Tikshna loha – Wrought Kanta - Magnetic	*Shandhat wa, Kushtha, Mrityu, Hridroga, Shula, Ashmiri*	*Jeevaha ra madaka ra, Dehash ula, Shareer a tanuta, Daruna hridi ruja, Ayu bala kanta*

			nasha
Naga	Galena(PbS) Lead Carbonate $PbCO_3$ Lead sulphate $PbSO_4$ Lead Chloride PbClF Lead oxide PbO	*Kushta, Gulma, Aruchi , Kshaya, Kapharoga, Rakta vikara, Pandu, Mutrakrichra, Jwara, Shula, Kamala, Prameha, Kampa , Kilasa, visha, Vatashopa, Vrdradi, Mushkaroga, Jadya, Mahadaha, Veeryanasha, Murcha.*	*Kushta, Gulma Atikashta, Pandu, Prameha, Anilasada, shota, Bhagandara.*
Vanga	Cassiterite (SnO_2) Stannite, Cylindrite, Franckeite, Canfieldite, Teallite	*Kushta, Gulma, Pandu, Prameha, Vatarakhta, Balanasha, Kampa, Kilasa, shula, Baghandara, Visha, RaktaVikara, Kshaya, Kaphajwara, Ashmari, Vidradi, Mushkaroga, Jadya, Mahadaha, Veeryanasha, Murcha.*	*Kushta, Gulma Atikashta, Pandu, Prameha, Anilasada, shota, Bhagandara, Apache, Vaatrakta, Balahani*
Yashada	Zinc sulphide (ZnS) Zinc oxide (ZnO) Zinc carbonate ($ZnCO_3$) Zinc silicate	*Prameha, Ajeerna, Vatavyadhi, Vami, Bhrama*	*Prameha, Ajeerna, Vatavyadhi, Vami, Bhrama*
Vajra	Kushta, Parshwa shula, Pandu, Shareera bharipan, Tapa, Jadya, kilasa, Daha, Guruta	*Pandu, Kushta, kilasa, Daha, Guruta.*	
Tankana	White colour Blue colour	*Vanti, Bhranti*	*Vanti.*

Review Of Arsenic:

Arsenic Form-Arsenic is a naturally occurring element that is widely distributed on earth crust. It is classified chemically as a metalloid having both properties of metal and nonmetal however it is frequently reffered as metal.Arsenic is colourless odorless tasteless on irritating gas that cause rapid and unique destruction.

Arsenic compound[14] –

1) Arsenic – Metallic arsenic – As
2) Arsenic acid- (4- aminophenyl)- $C_6H_8AsNO_3$
3) Arsenic Pentoxide- Arsenic oxide – As_2O_5
4) Arsenic sulfide- Arsenic sulfide – As_2S_3
5) Arsenic trichloride -Arsenic chloride- $AsCl_3$
6) Aesenobetaine- Arsonium carbxy methy trimethyl hydroxide, inner salt, 2-trimethylarsonioacetate $C_5H_{11}AsO_2$
7) Calcium arsenate- Arsenic acid (H_3AsO_4)- $(AsO_4)_2$.3Ca. Calcium salt(2:3)
8) Dimethylarsenic acid- Cacodylic acid – $C_2H_7AsO_2$
9) Lead arsenate- Arsenic acid (H_3AsO_4) Pb
10) Methanearsonic acid, disodium salt – Arsonic acid, methyldisodium salt CH_3AsO_3 2Na
11) Methanearsonic acid, monosodium salt – Arsenic acid – Methyl monosodium salt – CH_4AsO_3Na
12) Potassium arsenate –Arsenic acid (H_3AsO_4)- Monopotassium Salt- AsO_2K
13) Sodium arsenate- Arsenic acid (H_3AsO_4),Na monododium salt
14) Sodium arsenite –Arsenous acid , sodium salt AsO_2 Na
15) Sodium cacodylate – Arsinic acid – dimethyl- sodium salt –$C_2H_6AsO_2$.Na

Fate of arsenic drug[15] - The primary routes of arsenic entry into the body are ingestion and inhalation dermal absorption also occur but to lesser extent. Arsenic undergoes biomethylation in the liver. Approximately 70% of As is excreted, mainly in urine. Most of single low level dose is excreted within a few days after ingestion.

Fate of Drug

1) **Gastrointestinal drugs tract-** Trivalent Arsenic Compounds approximately 955 of ingested dose is absorbed form
2) **Lungs**
3) **Dermal-** mostly (Arsenic trioxide). Approximately within 60% to 90%. Fine particles are deposited more deeply in the respiratory tract
4) **Skin-** Generally negligible, either arsenic trichloride or arsenic acid was splashed on workers skin in occupational accident

Distribution-Absorption by lungs\gastrointestinal tract widely distributed by the blood thought out the body. Most tissues rapidly clear As except for skin hair and nails. 2-4 weeks after exposure ceases most of the arsenic remaining in the body is formed is Krratin

rich tissues such as hair nails skin and bone teeth. Metabolism Arsenic absorbed into blood stream at cellular level.1) by red blood cell.2) white blood cell.3) and other cells that reduces arsenate to arsenite Reduction of arsenate to arsenite (As111) is needed before methylation can occur . This reaction requires glutathione (GHS). Arsenite methylated in the liver Methylation has been considered the main route of arsenic detoxification but moe recently thee has been a growing body of literature supporting other detoxification mechanisms. For example a no. of animal species lack arsenic. Methylation and excrete inorganic arsenic detoxification mechanisms such as 1) antioxidant defenses 2) resistence to apoptosis 3) Transport there have also been studies of arsenic metabolism suggesting that methylation of inorganic arsenic may be a toxification rather than a detoxification pathway and that trivalent methylated arsenic metabolites particularly mono methyarsonous acid (MMA111) and methyl arsious acid (DMA111) are unusually capable of irritating with cellular targets such as protein and DNA. Methylation efficiency in humans appears to decreases at high arsenic doses. Patterns of methylated arsenic species in urine are similar between siblings which suggests that arsenic and parents which suggests that arsenic methylation is genetically linked . When the methylation capacity of the liver is exceeded exposure to excess levels of inorganic arsenic results in increased reduction of arsenic in soft tissues.

Excretion- Arsenic is excreted in the urine .Humans excrete a mix of inorganic, monomethylated and dimethylated forms of arsenic . The pentavalent metabolites MMA V and DMA V are less toxic than arsenite or arsenate. About 50% of excreted arsenic in human urine is dimethylated and25% is monomehtylated reminder being inorganic. According to urinary arsenic data from the National Health and Nutrition Examination Survey 2003-2004, as urinary levels of total arsenic increases and at lower urinary total arsenic levels, the predominant form is inorganic. Other less important routes of elimination of inorganic arsenic include feces , hair, nails, skin desquamation and sweat.

Poisoning of arsenic[16]–

1) Acute poisoning –

a)signs and symptoms

. Faintness depression,

. Nausea, burning pain in upper GIT, salivation, thirst.

. Severe projectile vomiting – vomitus initially contains stomach contents later blood and finally it is watery colour of

vomitus depends upon the colour of the salt.

. Pain and irritation of the anus.

. Diarrhea – foul smelling , initially contains faecal matter, later blood and finally is odourless, Colorless, ricewater stool of cholera.

. Oliguria, Albuminuria, hematuria and dysuria.

. Cramps of muscles, convulsion, dehydration, shock, coma, and finally death.

b) Inhalation of fumes- cough, frothy sputum, breathlessness, cyanosis, pulmonary odema, congetion of eyes and ulceration of cornea.

c) With large doses- Sudden death due to shock or mainly narcotic manifestations giddiness, pain in muscles, delirium, coma and death

2) Sub acute poisoning- Neuritis, paralysis and CVS disturbances, along with GIT manifestation. Also locked jaw, insanity, increased temperature, loss of speech and memory, hemolysis, haemoglobinuria, jaundice, hepatomegaly and aneamia.

3) Chronic poisoning-

a) Stage of nutritional and gastrointestinal disturbances- weakness loss of weight, loss of appetite, abdominal pain, constipation, red appetite, abdominal pain, constipation, red and soft gums and increased temperature.

b) Stage of catarrhal changes- Increased secretion from larynx, bronchi, hoarseness of voice, congested eyes, photophobia, running nose, cough with expectoration.

c) Stage of skin rashes- Brown, pin point pigmentation of the skin mainly covered parts known as Rain drop appearance' chronic ingestion causes vasodilation and the milk and roses complexion, nails become brittle and have linear pigmentation. Transverse white Mess lines appears on finger nails after about 15 days of exposure, indicating periods of arrested growth, Hair becomes dry pigmented and may fall of, anaemia, leukopaenia and thrombocytopenia are common.

d) Stage of CNS disturbances- Headache, tingling and numbers, muscle pain, bone marrow depression and heart involvement.

Fatal dose – 180-200 mg . trivalent are more toxic.

Fatal period- In narcotic form – sudden death or death after 2-3 hrs. In gastrointestinal form 12-48 hours

Treatment-

Use of emetics, gastric lavage with ferric oxide demulcent , Morphine for pain, I.V. fluids, Blood transfusion if required ,

Intravenous hypo is useful , purgatives. BAL given 3 mg/kg as 10% solution in Archis oil with Benzyl benzoate, deep intra muscularly, 4 hourly for 2 days, 6 hourly on 3rd days and 12 hourly till 10th day.

Arsenic in view of A*yurvedic* [17]-

Harital(Orpiment), *Manashila*(Realgar), and *Gauripasan*(White arsenic) are the commonly used Arsenical product in *Ayurvedic* medicine of India for wide range diseases after *Shodhan maran*. *Gauripasan* is now accepted in western medicine as first line chemotherapeutics agents against certain hematopoietic cancer. The arsenical compound are main active ingredients in *Ayurvedic* formulations or as auxiliary agents to assist the efficacy of herbal drugs. Many toxic metals are used in *Ayurveda* after *Shodhana* (purification) and *marana* (calcination). Shodhana is a method of triturating herbsand animal's product and heating of metals to metamorphosed into herbo mineral. It is a process to convert Inorganic materials to organic compound for better absorption, assimilation, reduce toxicity and to enhance the medicinal properties. Ayurveda well defined the toxic effect after ingestion of arsenicals without proper purification methods of Arsenical compounds.

Table no. 4 –Toxic effect of and therapeutic uses of Arsenicals of *Ayurvedic*

Name of arsenic product	**Chemical formula**	**Therapeutic dose**	**Toxicity**	**Therapeutic uses**
Haritaal (orpiment)	As_2S_3	30-60 mg	Serious skin manifestation, burning, wasting diseases, neurological manifestation	Skin diseases 'irregular fever, fistula in ano, piles and, sinus, nonheal ulcer, cough, cold, bronchitis aphrodiasiac, syphilis, cancer
Manashila (Realgar)	As_3S_4	15-30 mg	Asmari(stone),Dysuria,Anoxia and skin manifestation	Skin diseases, anorexia, wasting diseases like cancer and tuberculosis, chronic fever, vitiligo, infection diseases
Gauripasan	As_2O_3	1-4 mg	Burning , skin	Syphilis, Elephant

a(White Arsenic)			manifestation, Death	iasis, anemia, psoriasis, asthama, osteoarthritis, Spleenomegaly, Impotency, Cancer

Table no. 5- Formulation and antidote of Arsenicals compounds

Name of arsenicals	**Antidote**	***Ayurveda* formulation**	**Name of arsenicals**
Haritaal (orpinment) As_2S_3	*Sharkara + jeera churna or Kushmanda swarsa* for 3days	*Kasturibhairav, krumikashthanaalarasa, gulmakarasa, Chandkeshwararasa, Talakabhasma, Talkeshwarasa, Talasindoor, Nityanandanarasa, Manthanbhairavrasa, Raktapittankarsararasa, Rasendragutika, Vataganjakushakrasa, Vidyadhararasa, Sannipathabhairavrasa, Sameerpannagarasa etc*	*Haritaal* (orpinment) As_2S_3
Manashila (Realgar) As_3S_4	*Shadguna balijarita rasa sindoorain dosage or 2 ratti for 7days with madhu, sitopaladi churna or any anupana.*	*Kalagneebhairavrasa,kalanalrasa,Kulvadhurasa, Krumikashtharasa, Krumivinashanarasa, Krumiharrasa, Kshayakesarirasa, Gadamurarirasa, Trilukyachintamanirasa, Parnakhandeshwararasa, manashiladighruta, mrityusanjivanirasa, Mrutyuutthapan, shwaskutharrasa,etc.*	*Manashila* (Realgar) As_3S_4
Gauripasana(white arsenic) As_2O_3	*Milk with madhu* for 3 days	*Ardhawbheharyog, Kalanalrasa, Tandawriloha, Nityaditras, Mallavati, Mallasindoor, vadvanalras, Sannipatbhairavras, Sameerpannagrasa, Suchikabharanrasa etc*	*Gauripasana*(white arsenic) As_2O_3

Observation-

Trituration of curd leads to formation of ghee but it doesn't mean that curd is ghee. Similarly *bhasmas* are prepared form of heavy metals but they are not heavy metals. Proper Sanskar process like *Shodhan, Marana, Amritikarana* gives us *Shuddha bhasma*. After purifications the metals and minerals are subjected to separated cycle of incineration followed by triturating with same herbal juice. Thus the

form of product is herbo metallic incinerated form *(bhasma*) with new physical chemical properties. But improper incineration gives us *ashuddhabhasma*, which act like toxic in nature as heavy metals. Heavy metals and *ashudha/apakwa bhasma* has same toxicity exposure. According to Heavy metals, the primary methods of metabolizing arsenic in human is methylation. The main route of excretion of arsenic is the urine.

Conclusion-

Heavy metals explained as "Metals has with specific gravity greater than 5". Which mean when they are put on to the water they will settle at the bottom. But going by the test for *Bhasmas* for final approval to use on human cases must have a quality *Varitaratwa, Unnami, Rekhapurnatwa, Niruttha etc Bhasma parikshas*.That means it indicate that, in the process of repeated incineration the previous metal got completely destroyed that's why ancient achary named this process as *marana* (Killing of a metals). Thus *bhasmas* are not heavy metels, they are nano particles with a mixture of an organic and inorganic compounds. But if repeated incineration process will not gate done on metals, then proper *Bhasma* preparation will not get. These *bhasma* behave like *ashudha and apakwa bhasma*. So *ashudha bhasma* gives toxic effects. As *Ayurveda* explained *ashudha bhasma* sevan toxic effects which are similar to heavy metal toxicity. This prospective analysis of Arsenicals used in ayurveda medicine has given some light regarding the modern understanding of bioavailability, metabolism, toxicity, biological responses and pharmacological response with background of *Ayurveda* literature.

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