

## AYURVEDIC ASPECT OF ARSENIC AND ITS CHRONIC TOXICITY

Dr. Sushil Jangid<sup>1\*</sup>, Dr. Monika Sharma<sup>2</sup>, and Dr. Anita Sharma<sup>3</sup><sup>1,2</sup>M.D. Scholar (Ayu.), P.G. Dept. of Agad Tantra, National Institute of Ayurveda Jaipur.<sup>3</sup>M.D. (Ayu.), PhD, Associated Professor, P.G. Dept. of Agad Tantra, National Institute of Ayurveda.**\*Corresponding Author: Dr. Sushil Jangid**

M.D. Scholar (Ayu.), P.G. Dept. of Agad Tantra, National Institute of Ayurveda Jaipur.

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**ABSTRACT**

Arsenic was known as a therapeutic agent to ancient Greeks and Romans. Exposure to arsenic occurs through both natural and anthropogenic sources. Human health in the past and present is influenced by the amounts and proportion of chemical elements to which humans have been exposed. Humans are exposed to arsenic primarily from air, food and water. Drinking water may be contaminated with arsenic from arsenical pesticide, natural mineral deposits or improperly disposed arsenical chemicals. As the arsenic toxicant accumulate on cellular level after chronic and persistent exposure like cumulative poison (*Dushi visha*). There is no such treatment of chronic arsenic toxicity found in *Ayurvedic* original Text, but Enema therapy after bio purification and then symptomatic management may give complete relief.

**KEYWORD:** Arsenic, Arsenic toxicity, *Gauripashan*.**1. INTRODUCTION**

Arsenic, a metalloid, occurs naturally, being the twentieth most abundant element in earth's crust and is a component of more than 245 minerals. The inorganic forms consisting mostly of arsenite and arsenate compounds are toxic to human health. Humans are exposed to arsenic primarily from air, food and water. Chronic arsenic toxicity results in multisystem disease. *Ayurveda* is an ancient science and it mention various drugs (*Kalp*) and toxicity of arsenic in details, arsenic, it mimics with one sub type of cumulative (*Dushi visha*), as it accumulate on cellular level and exist for several years. In *Ayurveda* bio purification by means of induces emesis, purgation and blood lettings are useful to remove the accumulated toxicants like arsenic.

**4. CONCEPTUAL STUDY****4.1 Ayurvedic Properties of Arsenic Table no 1.**

| S.no | Properties                 | Ras Tarangini <sup>[1]</sup> | Brihat Ras Raj Sundar <sup>[2]</sup> | Ras Ratna Samuchhaya <sup>[3]</sup> |
|------|----------------------------|------------------------------|--------------------------------------|-------------------------------------|
| 1.   | Bitter( <i>Tikta Ras</i> ) | ✓                            | -                                    | -                                   |
| 2.   | Oily ( <i>Snigdha</i> )    | ✓                            | ✓                                    | ✓                                   |
| 3.   | Ras Viryakar               | ✓                            | ✓                                    | ✓                                   |
| 4.   | Ras Bandhakar              | ✓                            | ✓                                    | ✓                                   |
| 5.   | Tridoshaghan               | ✓                            | ✓                                    | ✓                                   |

**4.2 Source of Exposure****A. Soil, Vegetation, Water<sup>[4,5]</sup>**

Normally, arsenic occurs in air (0.02 µg/m<sup>3</sup>), natural water (0.05 mg/L), soil (0.05 mg/L), vegetation, plants

**2. AIMS AND OBJECTIVE**

1. To discuss, evaluate and elaboration on Ayurvedic aspect of Arsenic and its chronic toxicity in Human.
2. To establish the complete protocol of *Ayurvedic* management for chronic toxicity of Arsenic.

**3. METERIAL AND METHOD**

This article is based on personal experiences & textual review. Material related to Arsenic and its chronic toxicity in human was collected. All the *Brihatrayi*, *Laghutrayi* and available commentaries of those has reviewed. Modern Texts & various websites to collect information on the relevant topics were referred.

and forests (3-5 mg/Kg). Depending on geographic locations mentioned above, it is much higher. Airborne elements are high in dust storms (0.5 to 2 ng/Kg), in volcanic dusts (300 to 800 ng/Kg), in wild forest fires

(0.5 to 4.4 ng/Kg), in snow 10-20 pg/Kg) and in sea salt sprays (0.1 to 0.6 ng/Kg). It is high in metal rich soil (250 to 2500 ng/Kg). It is also high in some water supplies in Latin America (0.8 mg/L), in Western Pacific (2.34 to 0.9 mg/L), in shallow tube wells 24 to 36 m deep (0.06 to 0.58 mg/L) and 1.5 mg/L in an open drain near a chemical.

Factory in Calcutta. Arsenic is also known to accumulate in marine organisms such as fish, clams, shrimps (50 to 100 µg/Kg and more), of this element. Sea food contains organic arsenicals (arsenobetaine), arseno-sugars and arsenolipids. Marine products usually contain organic arsenic (arsenobetaine) in higher concentrations, is nontoxic and is excreted unchanged.<sup>17</sup> Organic arsenic was detected in shrimps as early as 1935 in amounts of 43 to 174 µg/Kg.

#### 4.3 Natural Arsenic Compound in Ayurveda Medicine Table no 2.

| Ayurvedic name | Popular name  | Chemical Formula               |
|----------------|---------------|--------------------------------|
| Haritala       | Orpinment     | AS <sub>2</sub> S <sub>3</sub> |
| Manashila      | Realgar       | AS <sub>2</sub> S <sub>4</sub> |
| Gauripasana    | White Arsenic | AS <sub>2</sub> O <sub>3</sub> |

#### 4.4 Diagnosis and Estimation of Arsenic.

Any history of exposure to known source of arsenic in atmosphere, soil, water, medications may help. Once suspected, arsenicosis is confirmed by laboratory methods. Arsenic in biological specimens is estimated by mass spectrometry, Neutron Activation Technique, Emission Spectroscopy and most practically like in Bombay by hydroxide generated atomic absorption Spectrometry.<sup>[9]</sup> Urinary arsenic estimation has been used since nineteenth century. Exposure of arsenic and its metabolites in urine is perhaps a fluid of choice as other biomarkers like nails, hair, blood or saliva poses a technically difficult problem.<sup>63</sup> Recently the urine proteomics to identify a decrease in B-defensin -1 in men is advocated in populations exposed to high arsenic

#### B. Industry

Besides soil, vegetation and drinking water, industries also contribute to higher levels of arsenic such as occupational exposure in wine growers, mining industry, smelters (USA), coal mining,<sup>25</sup> (China), manufacturers of insecticides, herbicides, rodenticides, pesticides, components of certain glass alloys, semiconductors etc.

#### C. Medications

Old arsenicals like antipsoriatic Fowler's solution (arsenites), antiluetic like Neoarsphenamine, Acetylarsan and arsenoxide for tropical Eosinophilia are nearly obsolete. However, there are increasing reports (particularly from some Western countries) about alternative medical therapies like herbal, ayurvedic and unani medications as a source to arsenic toxicity in humans from homemade brews.

levels. The availability of biomarkers of exposure, metabolism and biological effects may add to our understanding of arsenic health consequences and may add to our research tools. At present arsenicosis could be confirmed by high serum or tissue total arsenic by atomic absorption spectrometry and high urinary total arsenic and its metabolites.<sup>[10]</sup>

#### 4.5 Chronic Toxicity of Arsenic as per Ayurveda and Modern

*Somal* (Arsenic trioxide) is a poison under *Sthavar visha*, *Dhatu visha* in *Ayurveda*.<sup>[11,12]</sup> All arsenical compounds used in *Ayurveda* drugs are absorbed in gastro intestinal system. *Gauripasana* (Arsenic tri oxides) is highly toxic compounds to harital and manashila.

#### Clinical Manifestations of Chronic Poisoning (Ingestion) Table no 3.

|   |  |
|---|--|
| 1 | GIT – Loss of Appetite & Weight, Malaise, Salivation, Colicky Pain, Constipation or Diarrhea |
| 2 | Skin - Erythematous Hyperkerotic skin, Patchy Pigmentation                                   |
| 3 | Anemia & Leucopenia & Thrombocytopenia   |
| 4 | Peripheral Neuropathy  |

#### 5. MANAGEMENT OF ARSENIC TOXICITY W.S.R TO DUSHI VISHA TABLE NO 4.

| Sr | Procedure & Drugs                              | Sushrut <sup>[13]</sup> | Charak <sup>[14]</sup> | Ashtang Sangrah <sup>[15]</sup> | Ashtang Hridaya <sup>[16]</sup> | Yograt nakar <sup>[17]</sup> | Bhavprakash <sup>[18]</sup> | Vangsen <sup>[19]</sup> |
|----|--|-------------------------|------------------------|---------------------------------|---------------------------------|------------------------------|-----------------------------|-------------------------|
| 1  | Sudation ( <i>Swedan</i> )                     | ✓                       | -                      | ✓                               | ✓                               | ✓                            | ✓                           | ✓                       |
| 2  | Induced Emesis ( <i>Vaman</i> )                | ✓                       | -                      | ✓                               | ✓                               | ✓                            | ✓                           | ✓                       |
| 3  | Induced Purgation ( <i>Virechan</i> )          | ✓                       | -                      | ✓                               | ✓                               | ✓                            | ✓                           | ✓                       |
| 4  | ( <i>Ikshvaku Kalp</i> )                       | -                       | ✓                      | -                               | -                               | -                            | -                           | -                       |
| 5  | Mild Purgative ( <i>Kashyopokta Virechak</i> ) | -                       | -                      | ✓                               | -                               | -                            | -                           | -                       |
| 6  | ( <i>Sudha Kalp</i> )                          | -                       | ✓                      | -                               | -                               | -                            | -                           | -                       |
| 7  | <i>Dushi Vishari Agad</i>                      | ✓                       | -                      | ✓                               | ✓                               | ✓                            | ✓                           | ✓                       |
| 8  | Blood Letting ( <i>Sira Karma</i> )            | -                       | ✓                      | -                               | -                               | -                            | -                           | -                       |
| 9. | <i>Basti (enema)</i>                           | -                       | ✓                      | -                               | -                               | -                            | -                           | -                       |

All the *Acharya* except *Charak* mentioned the Sudation followed by Induced Emesis or Induced Purgation or both able to excrete the *Dushi Visha* from human body by means of purification and then administration of *Dushi Vishari Agad* after conciliating step (*Samsarjan Krama*). *Acharya Charak* has suggested Bloodletting & Medicine prepared from milky juice of *Euphorbia*, while *Acharya Vagbhat* has suggested Mild Purgative which is already mentioned in *Kashyap Samhita* in addition. *Yog basti* having *vat nashak anuvasan basti* and *pakwashaya shodhak niruh basti* should be used to pacify to *prakopak vat* due to chronic Arsenic toxicity. It should be given alternate in manner means first *anuvasan* than *niruha* (1:3:3:1) *vat nasak anuvasn basti* containing Bael, *Artni*, *sonapatha*, *Gambhari*, and *Patala* should be given in 120ml in quantity after meal. *Pakwashaya shodhak basti* containing *kwath of madan phal*, *Devdali*, *til laouki ke beej*, *Dhamargav*, *Indrayav* these drugs prepared with cow's urine should be given 400ml empty stomach.

## 6. CONCLUSION

Chronic toxicity of Arsenic is significant problem due to occupational and environmental exposure as well as consumption of drinking water. There is no such treatment of chronic arsenic toxicity found in original text, but enema (*Basti*) therapy after bio purification and then symptomatic management give complete relief.

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