



A CRITICAL INTERPETATION ON THE SAFETY AND TOXICITY STANDARDS OF VASANT KUSUMAKAR RASA

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ABSTRACT

An ayurvedic herbal mineral medication called Vasant Kusumakar Ras is utilized as an anti-hyperglycemic, aphrodisiac, and cardioprotective agent. It is well-known for its ability to control and stabilize blood sugar levels in people with diabetes mellitus. Vasant Kusumakar Ras is also advised for men's issues, urinary difficulties, mental disorders, and geriatric illnesses in addition to diabetes. The body receives natural immunity from this blend of several herbs and minerals, which also acts as a sugar-reducing agent for diabetes, and is given an energy boost. Those who are weak and emaciated might use Vasant Kusumakar Rasa, a natural medicine that gives nourishment, to increase their vitality. Heavy metals have significant therapeutic characteristics and can be given to patients in specified amounts after being properly processed as described in the Rasashastra, in accordance with the principles of Ayurveda medicine. Nevertheless, poor production techniques might leave larger concentrations of heavy metals in the finished product, which could be harmful. As an alternative to being consciously contributed, they might potentially be present as an impurity. The tendency of heavy metals to accumulate in important organs makes them a specific health danger. The presence of contaminants in medicine samples, whether herbal or pharmaceutical, is a serious problem since they may not only be intrinsically poisonous to some extent, but also negatively impact the drug's stability and shelf life

or result in unintended side effects. Due to the rise in toxicity reports, the fundamental worry of the modern Phyto medical age is the quality assurance of herbal formulations. As a result, contaminants in the final dosage form, both organic and inorganic (elemental), must be watched over and managed beginning with the raw ingredients themselves. The different characteristics of heavy metals in Ayurveda medicines are covered in this page, including their sources, techniques for determining them, their therapeutic value, their harmful consequences, and a summary of the numerous regulations and rules that apply to them.

KEYWORDS: Vasant Kusumakar Ras, Standardization, Significance, Toxicity, Safety, etc.

INTRODUCTION

Vasant Kusumakar Rasa is a popular Ayurveda herbo-mineral remedy for overall weakness brought on by diabetes. This blend of several minerals and herbs gives the body a natural defense mechanism and increases energy. Calcined aurum (Au), calcined argentum (Ag), calcined ferrum (Fe), calcined stannum (Sn), calcined plumbum (Pb), calcined mica, and coral are the major components of Vasant Kusumakar Rasa. All of the symptoms of Prameha, including polyuria, kara-pada daha (palm and foot burning), atisweda (excessive sweating), weakness, and weariness, can be effectively treated with these ingredients. Rasa can also be a good therapy for diabetes.¹

NIRUKTI

Two words make up the phrase "Vasant Kusumakar": "Vasant" means "A name of Kamdev," "Month of Chaitra-Vaishakha," or "spring Season." 'Kusumakar' stands for 'Garden,' 'Flower Garden,' 'Flower bouquet,' and 'Vasant ritu. Rasayana and an aphrodisiac are both utilized with Vasant Kusumakar Rasa. It gives the body's cells energy and aids in the treatment of weakness brought on by conditions like diabetes and other illnesses. Rasendra Sara Samgraha referenced Vasant Kusumakar Rasa, who is mentioned in AFI.

TABLE NO. 1 INGREDIENT OF VASANT KUSUMAKAR RASA

S.N.	Common name	Latin name	Part
1.	Swarna Bhasma	Calcined Aurum (Au.)	2 part
2.	Rajata Bhasma	Calcined Argentinum (Ag.)	2 part
3.	Kanta lauha bhasma	Calcined Ferrum (Fe.)	3 part
4.	Vanga Bhasma	Calcined Stannum(Sn.)	3 part
5.	Naga Bhasma	Calcined Plumbum(Pb.)	3 part
6.	Abhraka Bhasma	Calcined Mica	4 part
7.	Pravala Bhasma	Calcined Coaral CaCO ₃	4 part
8.	Mukta Bhasma	Calcined Pearl CaCO ₃	4 part
9.	Kasturi	Musk	1 part

[REFERENCES - Archana et al: Vasantkusumakar Rasa – “A Best Antidiabetic Drug In Modern Era”: A Review. International Ayurvedic Medical Journal {online} 2018 {cited October, 2018} Available from: http://www.iamj.in/posts/images/upload/2305_2311.pdf]

TABLE NO. 2 BAVNA DRAVYA OF VASANT KUSUMANKAR DRAVYA

S.N.	Common name	LATIN NAME	FAMILY	part	wt.
1.	Godugdha	Cow Milk		Q.S.	
2.	Ikshu rasa	Saccharum Officinarum Linn	Gramineae	Stem	Q.S.
3.	Vasa rasa	Adhatoda Vasica	Acanthaceae	Lf.	Q.S.
4.	Laksha rasa	Laccifer Lacca	Lacciferidae	Exudate	Q.S.
5.	Sugansh bala kwatha	Valeriana wallichii	Valerianaceae	Rt.	Q.S.
6.	Kadali kanda rasa	Musa sopientum	Musaceae	Bulb	Q.S.
7.	Kamal pushpa rasa	nelumbo nucifera	Nymphaeaceae	Fl.	Q.S.
8.	Chameli pushpa rasa	Jasminum officinale	Oleaceae	Fl.	Q.S.

[REFERENCES - Archana et al: Vasantkusumakar Rasa – “A Best Antidiabetic Drug In Modern Era”: A Review. International Ayurvedic Medical Journal {online} 2018 {cited October, 2018} Available from: http://www.iamj.in/posts/images/upload/2305_2311.pdf]

TABLE NO.3 PROPTERIES OF VASANT KUSUMANKAR RASA

S.N.	Name	Rasa	Guna	Virya	Vipak	Doshkarma	Actions
1.	Abhraka Bhasma	Madhua	Snigdha	Shita	Madhur	Tridoshnashaka	Rasayana, Vajikara, Dipana, Pachana, Mehnashak, Rakta sanjanan
2.	Swarna Bhasma	Kashaya, Tikta, Madhur	Guru, Snigdha, Picchila	Shita	Madhur	Tridoshnashaka	Vrishya, Balya, Rasayana, Ojovardhaka, Brihana, Dhatuposhaka, Pipasanashaka, Pramehanashaka
3.	Rajata Bhasma	Kashaya, Amla	Snigdha, Guru, Sara	Shita	Madhur	Vatakaphanas haka	Lekhana, Prasadana, Dipana, Rasayana, Pramehanashaka, Dhatuposhaka, Pipasanashaka

4.	Lauha bhasma	Tikta, Madhura , Kashay	Sar, Guru, RukSha	Shita	Madh ur	Tridoshanasha ka	Rakta Sanjanan
5.	Naga bhasma	Madhur, Tikta	Guru, Snigdha	Ushna	Madh ur	Tridoshanasha ka	Prameha nashak, Dipan, Aamapachan, rashaya n, Balya
6.	Vanga bhasma	Tikta, Amla	Laghu, Ruksha	Ushna	Madh ur	Kaphapittahara , Ishata vatavardhak	Pramehanashaka, Swapnadosha nashak a, Ratriswedanashaka, Dipana, Pachan a, Ruchikaraka
7.	Mukta bhasma	Madhur	Shita, Laghu	Shita	Madh ur	Kaphapittanas haka	Kshayanashak, Baly a, Hridya
8.	Pravala bhasma	Madhur	Shita	Laghu	Madh ur	Tridoshnashak a	Dipana, Pachan a, Viryavardhaka, Swednashaka, Ratriswednashaka
9.	Vasapatra rasa	Tikta, Kashaya	Laghu, Ruksha	Shita	Katu	Kaphapittanas haka	Meha, Kushthanash aka, Raktavardhaka, Mutrala
10.	Ikshu rasa	Madhur	Shita, Snigdha	Shita	Madh ur	Vatanashaka, Kaphavardhak a	Mutrala, Vrishya, Hridya, Pipasanaskhaka, Daahprashamana
11.	Kamal pushparasa	Kashaya, Madhur,	Laghu, Snigdha,	Shita	Madh ur	Kaphapittanas haka	Dahaprashamana, Mut

		Tikta	Picchila				ra virechaniya, Mut ra viranjaniya, Hriday a, Balya, Stambhaka
12.	Kadali kandarasa	Madhur	Guru, Snigdha	Shita	Madh ur	Vatanashaka, Kaphavardhak a	Dahanashaka, Kshat a, Kshaya, Pipasanashaka
13.	Chameli pushpa rasa	Tikta, Kashaya	Laghu, Snigdha, Mridu	Ushna	Katu	Tridoshshamak a	Mukha, Dant roghanashak, Mutrakriccha nashak a, Napunshakta nashaka
14.	Dugdha	Madhur	Mridu, Snigdha	Shita	Madh ur		

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The traditional Indian medical systems, commonly known as Indian systems of Medicine (ISM), are regarded as autonomous medical systems since they have a very strong conceptual foundation and have been used continually for a very long period. The three most significant traditional systems practised in India are ayurveda, siddha, and unani. The oldest and most widely used of the three systems is ayurveda, which has a consolidated history spanning several centuries. Ayurveda includes the use of natural components to eliminate the underlying cause of the illness by restoring balance and developing a healthy lifestyle to stop its recurrence. The terms AYU, which means life, and VEDA, which means knowledge, are the roots of the phrase Ayurveda. Ayurveda, then, is the knowledge of life.⁴

More than 12,000 Ayurveda universities, hospitals, and clinics may be found throughout India. Between 70–80% of the world's population, mostly from herbal sources, relies on non-conventional medications for their healthcare, according to the World Health Organization (WHO).⁵

SIGNIFICANCE OF AYURVEDA FORMULATIONS

- Due to the existence of many phytoconstituents, herbal formulations are particularly efficient in treating a variety of ailments, and the benefits are enhanced when appropriate herbs are combined in the PHF (Poly-herbal Formulations).
- Poly-herbal compositions have been demonstrated to have a wide therapeutic spectrum. The majority of them have a higher benefit ratio since they are safe at large dosages and efficacious at low ones.
- They have less negative side effects than allopathic medications. Modern allopathic medications aim to provide excellent treatment outcomes, yet the majority of them have negative side effects like weariness, nausea, and sleeplessness.
- Because PHFs are natural products, they are often more affordable, ecologically friendly, and widely accessible than allopathic medications. Owing to the lack of pricey contemporary therapies in rural regions and certain developing nations, they are in high demand all over the world.
- They are more patient and tolerant of others.
- Cheaper medications are a renewable resource provided by medicinal plants.
- As science and technology advance, medicinal plants' quality, potency, and safety have all significantly improved.
- They outperform all synthetic drugs globally in terms of effectiveness. Several of the most potent medications currently used by contemporary medical research are derived from herbal remedies.

PROBLEMS ASSOCIATED WITH THE USE OF HERBAL FORMULATIONS

- It's a common assumption that ayurvedic remedies are always safe, however this is untrue. When produced or utilized improperly, Ayurveda medications might have negative consequences, according to Charak Samhita.
- Because most patients don't inform their doctors about concurrent therapies, the usage of PHF in conjunction with allopathic medications has grown.
- It is challenging to acquire clinical repeatability of ayurvedic herbal formulations.
- Depending on factors such as geographic location, meteorological circumstances, environmental risks, collecting techniques and protocols, etc., raw material ingredients might change. Hence, standardizing the finished product for a reproducible quality is difficult. This lot-to-lot fluctuation would have a direct impact on the PHF's efficacy and safety.
- As the dosage must be determined based on whether a crude medication or an extract is used, the requirement to change the dosage regimen for the desired therapeutic effect appears to be complicated.
- Ayurvedic herbal formulae are harmful, yet the issue is still not fully resolved. The absence of heavy metals in medications, even in minute amounts, is well established to prevent toxicity. Drug specialists believe that about 6,000 medications sold under the "Ayurvedic form" include lead and mercury, which are the two most often found metals. These toxic substances are well-known to be powerful nephrotoxic, hepatotoxic, neurotoxic, and hematopoietic agents.

- Despite the introduction of the Pharmaceuticals Act and the Cosmetic Act to regulate production control and quality, Ayurveda herb preparation regulation is a little less strict in India, where the majority of ayurvedic PHFs are created and exported. For the application of patents and licenses to manufacture Ayurveda herbal-based goods, toxicology tests and clinical research on plant formulations are not required, according to acceptable clinical practice. [2,9]
- Marketed as dietary supplements, Ayurveda HMPs (Herbal Medicinal Products) are exempt from the strict quality standards of the 1940 Drugs and Cosmetics Act thanks to the Dietary Supplement Health and Education Act (DSHEA), which does not require evidence of safety or efficacy.

REGULATIONS FOR HERBAL MEDICINES

Ayurvedic medicine and other traditional Indian remedies are readily accessible worldwide, and more than 80% of the Indian population uses them.⁶ Each nation has its own set of rules and legislation governing both traditional and herbal medicines. According to WHO, each nation or region has to create a regulatory framework to oversee the proper application of herbal medicine.⁷

The lengthy history of usage in India makes traditional herbal treatments like Ayurveda, Siddha, and Unani (ASU) safe. The Drug and Cosmetics Act of 1940 states that no safety and effectiveness studies are necessary for marketing authorization as a result (DCA). In India, medicinal plants are governed by AYUSH (Ayurveda, Yoga, Naturopathy, Unani, Siddha, and Homeopathy), the Drug Act, and the Cosmetic Act 1940 (Amendment).

The AYUSH Department seriously considered it after an article in JAMA issued a warning about the harmful ingredients of several herbal-mineral medicines offered on American marketplaces. The state governments and manufacturers were instructed to test each batch of ASU formulations for the metal content that has been intended for export after administrative decisions prescribing restrictions on the concentration of particular minerals / metals were issued.⁸

The "Good Clinical Practice Guidelines for Clinical Trials in Ayurveda, Siddha, and Unani Medicine" were released by the then-Department of AYUSH in 2013 and are to be followed by researchers, sponsors, and pharmaceutical companies during clinical studies for ASU therapies. A Schedule Z for ASU medications, similar to Schedule Y of the Drugs and Cosmetics Act for Biomedicine pharmaceuticals, is also being developed by the Ministry of AYUSH.⁹

The department of AYUSH has started digitizing traditional medicinal formulas, manuscripts, knowledge, and documentation, as well as promoting regional medical customs, with the introduction of the IPR system. Indian medical systems' codified literature may be found in the database known as the Digital Library of Traditional Knowledge (TKDL). The Ministry of Science and Technology, the Department of AYUSH, the Ministry of Health and Family Welfare, and the Council of Scientific and Industrial Research (CSIR) are working together on this project, which is being carried out at CSIR.¹⁰

Regulatory guidelines have just been issued. The National Medicinal Plants Board (NMPB) and the AYUSH Department have created the India-specific guidelines on good agricultural practices (GAPs). The WHO's Good Agricultural Practices and Field Collection Practices (GAFCPs), which were created in 2003, as well as the GLOBALGAP Secretariat's Good Agricultural Practices, which are used in more than 80 countries, were both used as a guide in the creation of this standard.¹¹

HEAVY METALS

The metals are widely dispersed throughout the natural world and are abundant in both soil and water. In comparison to other metals, heavy metals are organic metallic compounds with a density that is at least five times that of water.¹²

Given the relationship between weight and toxicity, heavy metals also include metalloids like arsenic, which can cause low-level toxicity. Due to their occurrence at trace amounts (ppb range to less than 10 ppm) in many environmental matrices, heavy metals are also regarded as trace elements.¹³

Regardless of atomic mass or density, a heavy metal can be any hazardous metal. Any sort of metal (or metalloid) may be deemed a "contaminant" if it manifests itself in an unintended location or in a way that has negative effects on people or the environment. Lead (Pb), cadmium (Cd), mercury (Hg), arsenic (As), chromium (Cr), copper (Cu), selenium (Se), nickel (Ni), silver (Ag), and zinc are among the metals/metalloids (Zn). Aluminum (Al), cesium (Cs), cobalt (Co), manganese (Mn), molybdenum (Mo), strontium (Sr), and uranium are among other less frequent pollutants (U).¹⁴

SOURCES OF TOXIC HEAVY METALS IN HERBAL MEDICINAL PRODUCTS

Due to an exponential rise in the usage of heavy metals in industrial processes and products, exposure to metals has substantially increased over the past fifty years. Mining, processing minerals, smelting, and the tanning industry all contribute to the worsening of heavy metal pollution in emerging nations. One of the issues brought on by the growing use of fertilizers and other chemicals to fulfil the rising need for food production for human consumption is heavy metal pollution, which poses one of the gravest risks to water and soil quality as well as to human health.¹⁵

- The number of medicinal plants in the soil is substantially increased by natural sources of heavy metals, such as the movement of volcanic emissions from continental dust and the weathering of metal-enriched rocks due to prolonged air exposure.
- In addition, the use of metal-based pesticides and sewage sludges that are enriched with metals in agriculture, the burning of fossil fuels, the metallurgical and electronic industries, as well as military training and weaponry, are other human activities that can contaminate the soil and harm herbal medicines.¹⁶

- The environment, water supply, and agricultural land can all be contaminated by toxic wastewater components, which can then affect the human food chain. The crops are tainted and internalize adverse concentrations of metallic metals.
- The growing, harvesting, washing, and drying of medicinal plants—steps that go into the processing of the raw materials for herbal products—can also introduce heavy metals.
- The intentional addition of heavy metals during preparation as part of the healing ingredients is another source of heavy metal contamination. Accidental contamination during the manufacturing process is another possibility, including grinding, mixing, and exposure to heavy metals by metal release equipment that could be used at different stages of the processing part.

THE QUANTITATIVE DETERMINATION OF HEAVY METALS

The comprehensive examination of heavy metals in environmental, biological, and dietary samples may be done using a variety of methods. In order to destroy the organic matrix, analytical procedures frequently need for the sample to be concentrated beforehand and/or subjected to pretreatments such wet digestion, dry ash, microwave extraction, or dissolution. Creating sensitive and focused analytical techniques that can quantitatively characterize trace quantities of heavy metals in a variety of sample types is extremely difficult.¹⁷ The optical and electrochemical techniques used to identify heavy metals are summarized.

TABLE NO. 4 QUANTITATIVE DETERMINATION OF HEAVY METALS

Technique	Principle	Type of analysis	Applications
Atomic absorption spectrometry (AAS)	Absorption of radiant energy produced, by a special radiation source, by atoms in their electronic ground state	-Single element; -Multi-element analysis (2-6elements)	Widely used
Inductively coupled plasma with atomic emission	Measures the optical emission from excited atoms	Simultaneous mult i-element analysis	Widely used method for environment alanalysis
spectrometry (ICP-AES)			
Inductively coupled plasma with mass spectrometry (ICP- MS)	- Argon plasma used as ion source; -Used for separating ions based on their mass-to charge ratio	Simultaneous multielement analysis	-Widely used; -Isotope determination
Atomic fluorescence spectrometry (AFS)	Measures the light that is reemitted after absorption	Single element	-Mercury, arsenic, and selenium; -Complementary technique to aas

X-ray fluorescence (XRF)	-X-rays -Primary excitation source; -Elements emit secondary X-rays of a characteristic wavelength	Simultaneous determination of most elements	-Non-destructive analysis; -Less suitable for analysis of minor and trace elements
Neutron activation analysis (NAA)	-Conversion of stable nuclei of atoms into radioactive ones; -measurement of the characteristic nuclear radiation emitted by the radioactive nuclei	Simultaneous multielement analysis	-Most elements can be determined; -Highly sensitive procedure
Electrochemical methods	-Controlled voltage or current; -Polarography; -Potentiometry; - Stripping voltammetry;	Consecutive analysis of different metal ions	-Analysis for transition metals and metalloids (total content or speciation analysis)

(Reference- Agarwal Princy, Vaishnav Rajat, Goyal Anju. Usage of Heavy Metals in Ayurvedic Formulations and its Management: A Review. International Journal of Ayurveda and Pharma Research. 2018;6(5):33-47.)

Heavy metal toxicity is the buildup of heavy metals in the body's soft tissues in toxic amounts, which begins to interfere with the body's natural processes. Depending on the amount of metal that has accumulated, different symptoms and physical findings are linked to heavy metal poisoning. In extremely small amounts, several heavy metals, including zinc, copper, chromium, iron, and manganese, are necessary for the body to operate. However, substantial harm may result if these metals build up in the body in amounts high enough to be poisonous.¹⁸

THE TOXIC HEAVY METALS RESPONSIBLE FOR TOXICITY FOUND PRESENT IN AYURVEDIC PREPARATIONS (VASANT KUSHUMANKARA RASA)

LEAD (NAGA)- The most prevalent heavy metal is lead (Pb). Both organic and inorganic forms of it are present. Water-soluble salts like Lead acetate and insoluble salts like Lead oxides are both examples of the typically bivalent Pb compounds. The gasoline additives tetramethyl- and tetraethyl-lead are examples of organic Pb compounds. Inorganic Pb compounds are formed in water and soil when organic Pb compounds degrade very quickly in the atmosphere.

SOURCE OF EXPOSURE - The oldest occupational illness in the world is lead poisoning. In many different sectors, lead is utilized, for example, in paints, batteries, casings, illegal distillation, pipelines, gasoline, etc. Moreover, a lot of people live in environments where lead is present (air, food and water).

ABSORPTION - Mostly by inhalation by the lungs, digestion by the GIT, and to a lesser extent, absorption through the skin.

DISTRBUTION -Following absorption, lead is dispersed to soft tissues (liver, kidneys, muscles, spleen, brain, bone marrow, etc.), followed by skin, hair, nails, and bones. Lead can also pass the placenta. Lead is linked to RBC for 24 hours after absorption.

TOXICITY- Lead interferes with the function of enzymes by binding to -SH enzymes and forming complex ligands with several substances. Moreover, it obstructs the functions of cations.

PHARMACOLOGICAL ACTION - It acts as an Appetizer, aphrodisiac, and an immunomodulator. It alleviates urinary tract disorders and diseases caused by vitiated Vata and Kapha.

ADVERSE REACTIONS (ADR)-

ACUTE -Not very typical. The signs and symptoms include haemoglobinuria, oliguria, renal damage, thirst, metallic taste, nausea, vomiting, and abdominal discomfort.

CHRONIC- It affects gastrointestinal, CNS, hematopoietic system, kidney and others. The system may be affected alone or in combination. CNS is affected commonly in children, while the gastrointestinal system is affected in adults.

LABORATORY INVESTIGATION- The measurement of lead excretion following the administration of 1g of calcium ethylenediaminetetra-acetic acid (EDTA) has been considered the "gold standard" for determining the internal dosage of lead (as an i.v. infusion or i.m. injection). Excretion of more than 39/mol (800/g) of lead in adults or 2.9–3.4/mol (600–700/g) in children during the following 24 hours signifies an increased body burden.

Permissible limits (WHO): 10 ppm upto

VANGA (STENNUM)- Vanga (Sn) is a naturally occurring element that may be found in a wide range of inorganic and organic components, including food, soil, drinking water, and air. Inorganic As can be found in pentavalent or trivalent forms, which are mostly of geological origin and are typically recognized to be more poisonous (e.g., sodium stannate, Stennic pentoxide, and stannic acid). salts of Stennaum are some examples of organic Stennic compounds that include carbon and are mostly present in sea-living organisms.

Source of Exposure -Certain arsenicals are employed in the production of semiconductors as well as in the glass, electroplating, dyestuff, paint, and cosmetic industries as insecticides, fungicides, and rodenticides. The primary source of industrial arsenic is the combustion of coal in power plants and smelters.

Absorption -Stannic inhalation, GIT ingestion, and cutaneous absorption are all included.

Target Organs - The administration and the kind of Stennic chemical used are the key determinants of dispersion. It is mostly retained in RBCs (for 24 hours), liver, kidneys, spleen, muscles, the central nervous system (CNS), bones, skin, and hair (for a year), and it can pass the placenta.

Toxicity - By interacting with biological ligands that have sulfhydryl groups, trivalent Stennic binds to and inhibits SH-enzymes (sulfhydryl enzymes).

Pharmacological Action - In certain febrile illnesses, it functions as an antipyretic and anti-syphilitic. Moreover, it aids in the treatment of several skin conditions. Trypanosomiasis is also treated with organic arsenicals.

ADR (Adverse Reaction)-

Acute Toxicity - Laryngitis, bronchitis, vomiting, severe diarrhoea, nausea, and stomach discomfort. Shock symptoms start to show up as fluid loss rises. Death from acute poisoning may happen in one hour. Following the initial event, the patient may experience bone marrow suppression, encephalopathy, and a disabling sensory neuropathy.

Chronic Toxicity- Skin irritation, hair loss, sensory neuropathy, bone marrow depression, fatty liver, nephropathy, GIT irritation, etc. are typical symptoms that are typically brought on by inorganic arsenic.

Laboratory Investigation- Urine testing is suggested over whole blood testing for Stennic levels. Although it is more challenging to identify stable, non-toxic Stennic species, such as Stannobetaine, generated from dietary shellfish, their presence can make it challenging to establish Stennic poisoning from total Stennic readings.

Permissible limits [WHO]: 3 ppm upto

TABLE NO. 5 IMPORTANT HEAVY METALS USED IN AYURVEDIC FORMULATIONS

Heavy metals	Pharmacological actions	Therapeutic indications	Therapeutic dose	Adverse effects/Toxicity	Management of toxicity
Gold (Swarna)	Aphrodisiac, cardiac stimulant, immuno-modulator, increases potentiality, complexion, longevity, intellect, memory and attentiveness, in management of poisoning. It alleviates disorders caused by all the three vitiated	Tuberculosis, schizophrenia, fever, grief, anemia, dyspnea, cough, worm infestation, anorexia, ophthalmic disorders and in poisoning.	1/8th to 1/4th Ratti (15 to 30 mg)/ day	Weakness, impotency, leads to imbalance of homeostasis and even death.	Powder of Terminalia chebula fruit should be given repeatedly along with sugar candy (Sita) for 3 days.

	Doshas.				
Silver (Rajata)	Aphrodisiac, anti-ageing, scraping, immunomodulator properties, increases potentiality and intellect. It eradicates diseases caused by all three vitiated Doshas.	Diabetes, vitiligo, tuberculosis, anemia, dyspnea, cough, ophthalmic disorders, piles, thirst, emaciation and in poisoning.	1/4th to 1 Ratti (30 to 125 mg)/day.	Anemia, itching, fever, constipation, cervical lymphadenopathy, oligospermia, weakness, headache and reduce potency.	Sugar and honey should be given repeatedly for 3 days.
Iron (Lauha)	Aphrodisiac, anti-ageing, emaciating, immunomodulator properties, increases potentiality, complexion and appetite. It eradicates diseases caused by vitiated Kapha and Pitta.	Anemia, diabetes, tuberculosis, piles, skin disorders, worm infestation, cachexia, obesity, bowel syndrome, splenic disorders, hyperlipidemia, dyspepsia, spasmodic pain, and also in poisoning.	1/4th to 2 Ratti (30 to 250 mg)/day.	Angina, skin disorders, urolethiasis, spasmodic pain, burning sensation, weakness and even death.	Powder of Embelia ribes fruit should be given repeatedly with the Juice of Sesbaniagrandi flora leaves and patients should be exposed to sunlight. If worm infestation

(Reference- Agarwal Princy, Vaishnav Rajat, Goyal Anju. Usage of Heavy Metals in Ayurvedic Formulations and its Management: A Review. International Journal of Ayurveda and Pharma Research. 2018;6(5):33-47.)

SAFETY PROFILE

Vasant Kusumakar Ras generally has no negative side effects when used briefly, and no unusual symptoms develop as a result of its use. It is a heavy metal composition, nevertheless, and should only be administered under the guidance of an ayurvedic doctor. Vasant Kusumakar Ras may cause heavy metal poisoning if consumed over an extended period of time and at a dosage more than 500 mg per day. (Reference-<https://www.ayurtimes.com/vasant-kusumakar-ras/#scientific-research>)

PREGNAMACY AND BREAST FEEDING

Pregnancy and lactation are not recommended when using Vasant Kusumakar Ras. The presence of heavy metals may result in problems or malformations in a growing fetus. Vasant Kusumakar Ras should also be avoided by nursing women since it may secrete into breast milk and its high metal content may harm the kid. Infants' kidneys are not yet developed enough to handle mercury buildup, and they are more likely to experience inflammatory reactions and kidney cell damage.¹⁹

CONTAINDICATION

Vasant Kusumakar Ras, however, could enhance kidney functioning biochemically, but research has shown that it has harmful effects on histopathology. Vasant Kusumakar Ras' heavy metal concentration may cause kidney tissues to undergo apoptosis, or cell death. As a result, those who have renal illness of any kind should not take it.

DISCUSSION

The majority of the elements in Vasant Kusumakar Rasa possess the qualities of Madhur Rasa, Guru-Snigdha guna, Shita virya Madhur vipaka, Tridoshnashaka, Rasayana, and Vajikarana. These characteristics aid in Dhatuposhana karma; hence, they are helpful in Prameha. Deepana, Pachana, and Srotoshodhaka characteristics are also present in these medications. Vasant kusumakar rasa is particularly beneficial in the treatment of diabetes mellitus because of these characteristics. On a basic level, nevertheless, the use of bhasmas as medicine requires close scientific examination. Bhasmas may contradict the present concept of a medication, but due to the buildup of heavy metals in the human body, their toxicities, and methods for flushing them out, researchers may look into their application in therapy despite the limited availability of their clinical data. It is often an ayurvedic dietary supplement for these organs.²⁰ Yet, due to its powerful anti-hyperglycemic impact, it has gained popularity in recent years treating diabetes. It reduces blood sugar without resulting in hypoglycemia.

CONCLUSION

Vasant Kusumakar rasa is a highly effective diabetes medication. Vasantkusumakar rasa can be used to treat malnutrition-related illnesses and physical sluggishness. A large portion of the global population uses herbal medicines, some of which include harmful substances like heavy metals either as a therapeutic agent or as a

contaminant. Consumers may be subjected to a variety of harmful health consequences if these drugs include levels of heavy metals beyond the recommended limits. In order to reduce this danger, consumers and producers should be made properly aware of it. For appropriate processing of the heavy metals in these medications, the Rasa- Shastras should be carefully studied and its principles should be put into practice. Self-medication by patients nowadays without the right prescriptions should also be monitored and discouraged.

CONFLICT OF INTEREST -NIL

SOURCE OF SUPPORT -NONE

REFERENCES

1. GOI, MOHFW. Ayurvedic Formulary of India. Part – I, 2nd edition. New Delhi: NISCAIR, CSIR; 2003. p.273.
2. Amarakosha : Ksheeraswami commentary, edited by Sharma & Sardesi, Poona Oriental Book Agency, Poona 1941.
3. Madhav nidan; translated into English by Dr. K.R. Srikantha murthy; chaukhamba publication, Varanasi, krishnadas academy, p.116, 119.
4. Ashtanga hridayam , nidansthan translated into English by Dr.K.R. Shrikantha murthy , chaukhamba publication, Varanasi, p. 92-99.
5. Yogratnakar- pramehprakarnam, by Dr.Indeqdev Tripathi and Dr. Dayashankar tripathy, chaukhamba academy, Varanasi. p. 622 - 641.
6. Nicki R. Colledge et al. Davidsons Principles and Practice of Medicine. 21st ed. London: Churchill Livingstone elsevire; 2010. p.795-834.
7. Tripathi Bramhananda. Charak Samhita Vol-II. 7th ed. Varanasi: Chaukhambha Orientalia; 2012. p. 105.
8. The effects of Abharaka Bhasma on serum Testosterone levels & Epididymal sperm quality in Heat-stroke wistar Rats” Babita Bharti, Puroshottam Kale, RJ College, Mumbai.
9. Polyherbal formulation: Concept of Ayurveda. Pharmacogn Rev [Online]. 2014 [cited 2018, May 24];8(16):73-80.doi:10.4103/0973-7847. 134229.
10. Ayurveda. AYUR TIMES [Online]. [Last accessed on 11 Jan, 2018]. Available from: <https://www.ayurtimes.com/ayurveda/>
11. Chauhan A, Semwal DK, Mishra SP, Semwal RB. Ayurvedic research and methodology: Present status and future strategies. Ayu[Online]. 2015 [cited 2018, May 24];36(4):364-369. doi:10.4103/0974-8520.190699.
12. Dargan PI, Gawarammana IB, Archer JRH, House IM, Shaw D and Wood DM. Heavy metal poisoning from Ayurvedic traditional medicines: an emerging problem? Int J Environ Health[Online]. 2008 [cited 2018, May 24];2(3/4):463–74.
13. Thatte UM, Rege NN, Phatak SD, Dahanukar SA. The flip side of Ayurveda. J Postgrad Med [Online]. 1993 [cited 2018, May 24];39:179- 82,182a.

14. Viswanathan MV, Unnikrishnan PM, Komatsu K, Fushimi H, Basnet P. A brief introduction to Ayurvedic system of medicine and some of its problems. Indian Journal of Traditional Knowledge [Online]. 2003[cited 2018, May 24]; 2(2):159-69.
15. Kadam DK, Ahire PD, Bhoje JV, Patil AR, Yadav DK. Comparative standardization study of three triphala churna formulation. Int J Pharmacogn (Panchkula, India)[Online]. 2018[cited 2018, May 24]; 4(2):71-78. DOI: 10.13040/IJPSR.0975- 8232.IJP.
16. Pal SK, Shukla Y. Herbal medicine: Current status and the future. Asian Pacific Journal of Cancer Prevention[Online]. 2003[cited 2018, May 24]; 4:281–8.
17. Sharma AK, Kumar R, Mishra A, Gupta R. Problems associated with clinical trials of Ayurvedic medicines. Brazilian Journal of Pharmacognosy [Online]. 2010 [cited 2018, May 20(2): 276-81.
18. Verma N. Herbal medicines: Regulation and practice in Europe, United States and India. International Journal of Herbal Medicine [Online]. 2013 [cited 2018, May 24]; 1(4):1-5.
19. <https://www.ayurtimes.com/vasant-kusumakar-ras/#scientific-research>
20. Agarwal Princy, Vaishnav Rajat, Goyal Anju. Usage of Heavy Metals in Ayurvedic Formulations and its Management: A Review. International Journal of Ayurveda and Pharma Research. 2018;6(5):33-47.

