

Zinc in Ayurvedic herbo-mineral products

Ashok Kumar Panda^{1*} and Suwendu Rout²

¹Regional Research Institute (Ayurveda), Tadong, Gangtok -737102, Sikkim, India

²Sri Jayendra Saraswati Ayurveda College, Chennai-602 103, Tamil Nadu, India

* Correspondent author, E-mail: akpanda_06@yahoo.co.in

Received 1 June 2005; Accepted 17 March 2006

Abstract

Zinc is a trace element and plays a vital role in all physiological processes in humans. It has been introduced as a drug in the prevention and treatments of diseases since last two decades. The Ayurvedic physicians have practiced both oral and topical applications of zinc after *sodhana* (purification) and *marana* (calcification) before 14th century A.D. *Rasaka* or *Kharpara* (zinc ore or zinc carbonate), *Yasada* (zinc metal), *Puspanjana* (zinc oxide) and *Pittala* (brass) are zinc-containing minerals used as therapeutic agents in Ayurveda. *Rasaka* or *Kharpara* are found in most (20 i.e. 66.66%) of the formulations, *Yasada* (zinc metal) in 5 (16.66%), *Pittala* (brass) in 4 (13.33%) and *Puspanjana* (zinc oxide) is used in one formulation. Therapeutic uses of zinc in Ayurveda and modern system of medicine have been discussed in this paper.

Keywords: Alchemy, *Bhasma*, *Yasada*, Zinc metal, *Puspanjana*, Zinc oxide, *Pittala*, Brass, *Rasaka* or *Kharpara*, Zinc ore, Zinc carbonate.

IPC code; Int. cl.⁷ — A61K 33/30

Introduction

Ayurveda deals with the three available natural resources for its medicaments. These are plant resources or vegetative products, animal resources like blood, urine, milk, ghee (clarified butter), horn, musk, etc. and mineral resources¹. Minerals and metals are processed and extensively used therapeutically in *bhasma* (calcified powder) from prior to the 3rd century A.D.². The Buddhist philosopher Nagarjuna is the father of metallic medicine in India. Subsequently a special branch of medicine, i.e. *Rasa-Sastra* (Alchemy) was developed which deals with herbo-mineral products. The books on *Rasa-Sastra* like — *Kakshyaputa tantra*, *Rasa Ratna Sammucchaya*, *Rasa tarangini*, *Rasayoga sagar*, *Rasendra sara*

samgraha, *Bhaisaya Ratnabali*, etc. were mostly composed during 8th century and there after². The zinc containing formulations were used externally during 2nd century A.D., whereas internal use of these formulations is reported from 14th century onwards³.

Zinc (Zn) is a trace element and an essential nutrient in humans. It plays a vital role in all physiological processes. It is a component of many metal-proteins and enzymes. Its functions in cells and tissues depend on those metallo-proteins and enzymes with which it is associated⁴. The daily Zn requirement varies with age, sex and growth state of the body. It is approximately 10-20mg/day in normal adult and 20-25mg/day for a pregnant lady to provide extra zinc for the growing foetus⁵. Absorption of zinc in the small intestine is decreased by fibres, Phytic

acid, calcium and copper and increased by remainder glucose, amino acid, peptide and other chelating agents. Nearly 90% of Zn is inside the cells and the remainder in plasma and extra cellular fluid. Plasma Zn is the source of metal for cellular needs. In brain the highest amounts of Zinc are in hippocampus and cerebral cortex. Plasma Zn level is decreased in pregnancy and with the use of oral contraceptives, in catabolic states such as trauma, burns or a surgery and in haemolytic and sickle cell anemia. Plasma Zn is also decreased with acute myocardial infarction infection, malignancy, hepatitis and many other diseases. The systems involved and influenced by Zinc include the reproductive, neurological, immune, dermatological and gastro-intestinal systems. Zinc deficient cells fail to divide and differentiate with consequence growth impairment, tissue with high rate of turnover in skin and gastro-intestinal mucosa. It also helps in wound healing and development of cell-mediated immunity⁶. Zinc is widely distributed in vegetarian and non-vegetarian foodstuffs. The bioavailability of zinc in vegetable is low. Animal foods such as meat, milk, fish, etc. are dependable sources of zinc⁷. Zinc toxicity occurs by inhalation of zinc fumes (by welder), oral ingestion of medicine and zinc contaminated food and water or intravenous administration. The toxic symptoms are gastric ulcer, pancreatitis, lethargy, anemia, nausea,

vomiting, respiratory distress and pulmonary fibrosis. This may be due to impaired chemotaxis, phagocytosis, pinocytosis and platelet aggregation⁸.

Zinc is mostly used as nutraceutical products in the form of zinc sulphate or zinc sulphate monohydrate. Zinc phosphates are used for killing cockroaches and rats. Calamine and zinc oxide are used as adsorbent and flexible occlusive coating in skin and used as plaster, powder, etc⁹.

Zinc in Ayurvedic literature

Elementary zinc is referred as *Yasada* in Ayurveda. *Rasaka* or *Kharpara* (zinc ore or zinc carbonate), *Yasada* (zinc metal), *Puspanjana* (zinc oxide) and *Pittala* (brass) are zinc containing minerals used as therapeutic agents in Ayurveda¹⁰. The term *Yasada* and the therapeutic uses of zinc are not

found in the major classical texts like *Charaka Samhita*, *Susruta Samhita* and *Astanga Hridaya*¹¹. But the zinc-containing alloy *Pittala* is found in the above said classical texts of Ayurveda. Sarangadhara was the first author to describe about the medicinal uses of *Yasada* in 14th century. The Ayurvedic physicians have practiced both oral and topical applications of zinc after *Sodhana* (purification) and *marana* (calcification). All zinc containing metals are cold in potency (*sheeta virya*), astringent in taste and indicated in *Kapha*, *pitta* disorders except *pittala* which is hot in potency and bitter in taste¹². The common indications of zinc containing metals are eye diseases, urogenital pathology, general debility and emaciation, anemia, toxic condition infection, skin diseases, cold and cough, chronic ulcer, etc¹³. Ayurveda also mentioned about the toxicity of zinc containing metals and minerals if it is used

in impure form or in high dose. The toxic symptoms are *gulma* (gastric upset), *prameha* (urinary problems), skin rashes, etc¹⁴. The properties and therapeutic uses of zinc-containing metals are given in Table 1

Zinc in Ayurvedic preparations

In Ayurveda, natural products are easily processed in natural form and used fresh for various ailments. *Pancha vidha kasaya kalpana* (five pharmaceutical processing) are the basic methods of preparation of plant products for internal administration which are *Svarasa* (Juice), *Kalka* (Paste), *Sruta* (decoction), *Sheeta* (cold infusion) and *Phanta* (hot infusion). *Churna* (Powder) and *Asava & Arista* (Alcoholic preparations) are the latter development of *Kalka* and *Sruta* processing, respectively. *Vati Kalpana* (Tablet) was successive

Table 1 : Summary of properties and therapeutic uses of zinc containing metals^{13,14}

Name of the drug	Mode of use & dose	Medicinal properties	Therapeutic uses
<i>Pittala</i> (Brass)	Oral administration; 30-60mg	Bitter taste, hot potency	Skin diseases, bleeding disorders, parasite infection, severe anemia, Liver and spleen diseases.
<i>Puspanjana</i> (Zn O)	External use after purification	Astringent taste, cold potency, unctuous ulcer, eczema, burning sensation in	It promotes eyesight and cures conjunctivitis and trachoma. Chronic severe hiccough, irregular fever and toxic condition.
<i>Rasaka</i> (ZnCO ₃)	Internal use; 30-120mg	Astringent taste, cold potency, unctuous, decreases <i>kapha</i> and <i>pitta</i> .	Eye diseases, diabetes, skin diseases, urinary stone, useful in sosa (PTB) and pyrexia of unknown etiology.
<i>Yasada</i> (Zinc)	Oral and external use; 30-60mg	Astringent taste, cold potency, decreases <i>kapha</i> and <i>pitta</i>	Eye diseases, diabetes, cold and cough, bronchial asthma, wound healing.

deployment of pharma processing may be due to unpalatable taste of the above preparations and storage problems. The mineral remedies bring a revolution in the pharmaceutical processing in that time because these drugs are effective in small dose, palatable in taste and quick in action compared to plant products. Zinc containing minerals are purified by the prescribed methods and roasted to calcinized powder form (*bhasma*). These are used as single drug or combined

with other minerals like *trivanga bhasma* or mixed with other herbs and minerals in tablet form. A total eighty-four zinc-containing preparation are found in our classical preparations^{15, 16}. *Rasaka* or *Kharpara* (zinc ore or zinc carbonate) is found in most (20 i.e. 66.66%) of the formulations, *Yasada* (zinc metal) in 5 (16.66%), *Pittala* (brass) in 4 (13.33%) and *Puspanjana* (zinc oxide) is used in one formulation among the zinc-containing preparations

(Table 2). Calamine and Zincovite ore are the natural resources for *Rasaka* or *Kharpara*. *Puspanjana* is used for eye disorders and some internal problems. Nearly 40% zinc-containing preparations are indicated for various types of fever. *Pittala* containing preparations are mainly used in tumour and vascular diseases. The well-designed clinical study has confirmed the safety of *Yasada bhasma* for long-term use in various biochemical parameters¹⁷.

Table 2 : List of zinc containing Ayurvedic preparations and their therapeutic uses^{15, 16}

S.No.	Name of the preparation	Zinc containing minerals	Prime indications	Other indications
1.	Akadasayasa rasa	Pittala	Vridhi (Growth)	Hydrocele, vericocele
2.	B.Chintamoni rasa	Kharpara	Jvara (fever) bronchitis, TB	Spleen and liver growth, fever,
3.	Baidyanath rasa	do	Edema	Irregular fever, anorexia, fever
4.	Bhasma	do	Apasmara (Fits)	All types of fits, psychosis sannipata javara (complicated fever)
5.	Churnanhana	Puspanjana	Eye	Cataract, pterigism
6.	Kasturi bhairava rasa	Kharpara	Jvara (fever) psychosis, TB	Oligospermia, cough, cold, diabetes,
7.	Kshyakeshri rasa	do	Rajyakma memory loss	Fever, TB anemia, emaciation,
8.	Laximivilasa rasa	do	Pradara (White discharge)	Cough, bronchitis anemia, jaundice, edema
9.	Maha jvarankusa rasa	Kharpara	Pradara (white discharge)	Visama jvara (irregular fever)
10.	Meha hara rasa	Yasada	Prameha	Diabetes, chyluria
11.	Mrutasanijivani rasa	do	Jvara	Fever, anemia, edema
12..	Navagraha rasa	Kharpara	Vatayadhi Neuro problems	Piles, cyst, fistula, G.I. problems, body ache
13.	Pitalla rasayana	Pittala	Rasayana	Vigour and vitality

S.No.	Name of the preparation	Zinc containing minerals	Prime indications	Other indications
14.	Pradarantaka lauha	Kharpara	do	White discharge
15.	Pratapa tapana rasa	do	Jvara (Fever)	Intermittent fever
16.	Ratnaparava vati	do	do	White discharge, severe musculo-skeletal pain
17.	Sadanana rasa	Pittala	Anorexia	Dysentery, G.I. disease
18.	Sannipatantaka rasa	Kharpara	Jvara	Complicated fever
19.	Sarva rogahara rasa	do Neuro problems	Vatavyadhi anemia, pain	Edema, rheumatoid arthritis,
20.	Silajawadi vati	Yasada	Prameha	Diabetes, dysuria
21.	Somanath rasa	Kharpara	Prameha	Diabetes, insipidus
22.	Sutika hara rasa	do	Sutika (Puerperial) problems, dysentery	Anemia, edema, all types of post partum
23.	SuVasnta malatee rasa	Kharpara	Prameha	Irregular fever, piles
24.	Swarna sindura rasa	Pittala	Sex problem	Impotency, anorexia, memory problem
25.	Trishnadi gutika	Kharpara (Bleeding)	Raktapitta emaciation, T.B	Fever, debility, cough bronchitis,
26.	Trivanga bhasma	Yasada	do	Infertility, diabetes
27.	Tyihikari rasa	Kharpara	do anorexia	Irregular fever, splenomegaly,
28.	Vangastaka rasa	do	Kasa (Cough)	Diabetes, urological problem
29.	Visweswara rasa	do	Jvara	All types fever, night fever, irregular fever
30.	Yasadamruta ointment	Yasada	Vrana (Wounds)	All types of skin diseases, fistula

Conclusion

Zinc has been introduced as a drug in the prevention and treatment of many diseases since past two decades. It aggressively promoted and many doctors prescribe zinc containing multivitamins or antioxidants for various purposes. Ayurvedic pharmaceuticals have also started marketing polyherbal compounds with zinc as health promoting, disease

preventing and supportive therapy in many diseases. Ayurveda explained the beneficial effect of zinc in eye diseases but we cannot find any supporting modern literature in connection with zinc and eye diseases. Ayurvedic doctors frequently administer zinc containing preparations in fever which suggests its role in immune system. It is also used in diarrhoea, dermatitis and psychological disturbances. Zinc is essential for normal embryonic

development, deficiency results in malformation of brain, eyes, bones, heart and other organs. But Ayurveda is silent about the use of zinc in antenatal care. Zinc has been used as a sex stimulant to increase the sperm count and it is added in many herbo-mineral compounds probably to activate the phytohormone because steroid and other hormones are zinc dependent¹⁸.

Zinc containing metals and minerals are widely used in Ayurveda ranging from G.I. problems to neurological problems. Recent biochemical analysis suggested that bioavailability of zinc from Ayurvedic formulations is better absorbed as compared to the modern formulations¹⁸. The beneficial effect of zinc in eye disorders should be re-investigated. However, modern understanding of zinc pharmacology is well comparable with that of Ayurveda.

References

1. Agnivesha, *Charaka Samhita, Sutra Sthna*, 1st Chapter, verse no.68, commentary by Kashinath Sastry, Chaukhamba Sanskrit Academy, Varanasi, 1st edn, 1991.
2. Rao Ramachandra SK, *Encyclopaedia of Indian Medicine*, Popular Prakasana, Mumbai, 1st edn, reprint,1998, Vol.1, pp.17-18.
3. Sarangadhara, *Sarangadhara Samhita, Purbardha*, 3rd Chapter, verse no. 34-46, Chaukhamba Sanskrit Academy, Varanasi, 1st edn, 1998.
4. Ray PC, *History of Hindu Chemistry*, Barati Prakasana, Kolkata, 1902, Vol.1, pp.10-13.
5. Guyton and Hall, *Text book of Medical Physiology*, Saunders, Philadelphia, 1st Indian edition, 2001, pp. 813.
6. Harrison's *Principle of Internal Medicine*, International edition, 14th edn, 1998, pp. 420-421.
7. Park's *Text Book of Preventive and Social Medicine*, M/S Banarasidas Bhanot, Jabalpur, 1997, pp. 405.
8. Rao Nagesh Kumar, *Text book of Forensic Medicine and Toxicology*, Japee Brothers, New Delhi, 1st edn, 2000, pp. 440.
9. Goodman and Gilman's, *The Pharmacological basis of therapeutic*, 9th edn, 1996, pp.1549.
10. Vaidya Bagwan Dash, *Alchemy and metallic medicine in Ayurveda*, Concept Publishing, Company, New Delhi, 1986.
11. Panda AK and Mohanty N, Zinc is an Ayu-allo drug, *Sachitra Ayurv*, 1995, 34-36.
12. Mahadihassan S, *Indian Alchemy*, Motilal Banarasidass Publication, 2nd Rev. edn, 1991, pp. 23-24.
13. Bhagbhat, *Rasa Ratna Sammuhaya*, 13th Chapter, Verse no. 44-56, Krishnadas Academy, 1st edn, 1967.
14. Bhatt Gopal Krunna, *Rasendra Sara Sangraha*, 5th Chapter, Verse no. 14-16, Krishnadas Academy, 1st edn, 1981.
15. Sen Gobindas, *Bhaisajya Ratnavali*, edited by Ambicadutta Sastri, Chaukhamba Sanskrit Samsthan, Varanasi, 12th edn,1996.
16. Sharma Hariprapanna Pandit, *Rasayogasagara*, Vol. 1& 2, Krishnadas Academy, 1st edn, 1983.
17. Mukharjee B and Shaw BP, Effect of *Yasada bhasma* on different diseases of G.I.T. with special reference to Gastric ulcer, M.D. Thesis, Calcutta University, 1993.
18. Mohanty N, The safety and efficacy of treevanga bhasma in sperm pathology, M.D. Thesis, Banaras Hindu University, Varanasi, 1984.