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PITTALA AND ITS FORMULATIONS: A REVIEW

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ABSTRACT

Pittala is a metallic alloy known as Brass worldwide typically comprised of 66% copper and 37% zinc. The Classical texts divided *Loha* or *Dhatus* into three categories i.e., *Shudh Loha, Puti Loha,* and *Mishra Loha*. *Pittala* is popularly categorized under *Mishra Loha*. As per the description available in Rasa Granthas, *Pittala* constitutes of *Tamra* (Copper) and *Yashada* (Zinc) in a 2:1 proportion. *Pittala* is processed into *Bhasma* through the *Shodhana* and *Marana* processes. Its ethnomedicinal use is in *Raktapitta, Krimi, Kushta,* and *Pandu Roga*. Very few literary studies on *Pittala* are currently available. *Pittala Bhasma* retains the property of both *Tamra* (copper) and *Yashada* (zinc). It has *Tikta Rasa* (bitter taste), and its *Virya* (potency) is either *Ushna* (hot) or *Sheeta* (cold), which depends on the variety of *Pittala* and the diversity of drugs used in the process to make *Bhasma*. It is also a constituent in several formulations, including *Pittala Rasayana, Meghnada Rasa, Ratna Prabha Vati, Shadanana Rasa, Swarna Sindooram,* and *Ekadashayas Rasa*. These formulations are utilized in diseases like *Jwara, Keeta, Stri Roga, Snayu Roga, Urustambha,* and as well as *Rasayana*.

Key words: Brass, *Mishra Loha, Pittala, Tamra*

INTRODUCTION

Pittala (Brass) has been prevailing since prehistory. It is an alloy of copper and zinc. In Rasa Shastra, Loha is categorized into three groups, i.e., *Shudha Loha* (noble metals), *Puti Loha* (foul smell producing metal, on heating), and *Mishra Loha* (alloy). [1] *Pittala* is classified among *Mishra Loha*. Formerly, it was incorporated in the *Loha* group but thereafter in the *Mishra Loha* along with *Kamsya* (white copper) and *Varta Loha* (Bronze). Rasa Hridaya Tantra divided *Loha* into three classes i.e., *Saara Loha, Satvaloha*, and *Putiloha* where *Pittala* is segregated in *Satvaloha* [2]. *Pittala* is quoted in a wide array of Rasa Shastra texts like Rasa Tarangini [3], Rasa Ratna Samuchchya [1], Rasendra Chintamani [4], Ayurved Prakash [5], Rasa Prakash Sudhakara [6] and Rasa Jal Nidhi [7]. It is made up of *Tamra* (copper) and *Yashada* (Zinc) in a 2:1 proportion [8]. *Pittala Bhasma* is advisable in the regimen for extensive ailments like *Pandu* (Anemia), *Krimi* (Worm infestation), *Raktapitta* (Bleeding Disorder), *Kushtha* (Skin diseases), *Jwara* (Fever), etc. It is an element in the formulations such as *Pittala Rasayana, Meghnada Rasa, Ratna Prabha Vati, Shadanana Rasa, Swarna Sindooram, and Ekadashayas Rasa*.

Synonyms of *Pittala*

Riri, Sulohaka, Brahmi, Ragyi, Kapila,Brahmriti [9], Shudrasuvarna, Sinhlaka, Pingal, Pitalak, Lohitak, Bhaarkutta, Pingal Loha, Peetak [10], Peetloha, Vartloha, Triloha, Aara, Aarkuta, Rajriti, Ragyi, Riti, Maheshvari [11], Lohaka, Pinga, Kapiloha, Suvarnaka, Aara, Sehlaka, Nishthur, Darukantaka [12], Dravyadaaru, Mishra, Patikaver [13], Sokyamarak, Vartloha, Triloha, Sheshnaka, Bharat [14], Sitkanaka, Pingalaloha [15], Peetloha, Kapiloha [16].

Vernacular Names [17]

Sanskrit- Pittala, Aar, Aarkuta, Riti.

English– Brass.

Hindi- Peetala, Kanchi Peetala.

Marathi– Sonapittala,

Gujrati– Peetala.

Farsi– Viranja,

Telungni- Ittadi.

Table 1. Varieties of *Pittala* as mentioned in different classics.

Classical Text	No. of types	Name
Ayurveda Prakash [5], Brihadrasarajasunder [18], Rasendra Sambhav [19], Yogaratnakar [20]	2	*Rajritika* *Kaktundi*
Anandkandam [21], Rasendra Chudamani [22], Rasa Prakash Sudhakar [6], Rasa Ratna Samuchchya [1], Rasa Darpan [23].	2	*Ritika* *Kaktundi*
Rasa Jala Nidhi [7]	2	*Rajritika* *Bhramariti*
Rasayana Sara [24]	2	*Rajriti* *Shuktunda*

Table 2. *Rasa Panchak*a (Ayurvedic Pharmacological Property) of *Pittala*: [25]

Rasa (Taste)	*Tikta* (Bitter), *Katu* (Pungent), *Lavana* (Salty)
Guna (Quality)	*Ruksha* (dryness)
Virya (Potency)	*Ritika: Sheeta* (Cold) *Kaktundi: Ushna* (hot)
Vipaka (Post Digestive State)	-
Karma (Pharmacological Action)	*Tridoshahara, Shodhana, Panduroghara, Krimighana, Na-atilekhana, Pliharoga nashak, Raktapittanuta, Bal-virya-ayuvardhana, Jantughana, Kushthaghani, Basti Vishodhana*

Note: In Anand Kanda, Rasendra Chudamani, Rasa Ratna Samuchchaya, and Rasa Jala Nidhi, it has been mentioned that *Pittala* if acquired with *Ushna Virya* or *Sheeta Virya Dravyas*, it acts correspondingly which means *Pittala* concedes "Y*ogavahi*" property.

Preparation of *Pittala Bhasma*:

All metals and minerals undergo the two essential processes of *Shodhana* and *Marana* to transform into their most potent dose form, known as *Bhasma.* Rasa Tarangini has mentioned *Shodhana* (purification) as a process of elimination of *Doshas* from the *Lohadi Dhatus* by subjecting them to a procedure like *Peshana, Mardana* (trituration), *Bhavana* (levigation), etc. with a previously prescribed *Aushadha* drug. [26] The *Shodhana* process is categorized further into *Samanya* (General procedure for all metals) and *Vishesha* (Specific procedure for a single metal). After this procedure, the *Marana* process is performed. *Marana* is described as the process by which metals and minerals are grounded with liquids (*Svarasa* etc.) and when dry reduced to *Bhasma* by heat.[26] For proper achievement of *Paka* of *Rasadi Dhatus*, a quantum heat (*Agni*) in the form of *Puta* is required which should be neither less nor more.[26] Pittala ought to undergo *Shodhana* and *Marana* procedures in order to be administered medicinally.

***Shodhana* (Purification):** [25]

It is a series of processes in which five *dravas* (fluids) are used as quenching media viz, *Taila* (Sesame oil), *Takra* (Buttermilk), *Gomutra* (Cow's urine), *Kanjika* (Sour Gruel), *Kultha Kwatha* (decoction of Horse gram). *Pittala* is heated and quenched 7 consecutive times in each media, in successive order. To mitigate toxicity and enhance potency, it requires *Vishesh Shodhana* after *Samanya Shodhana.*

Marana (Incineration): [25]

For *Pittala* to be appropriate for internal administration, the *Shodhana* process must be implemented and succeeded by the *Marana* process. It is considered to be the ultimate stage in achieving the formation of nanoparticles. On the basis of the *Bhavana Dravya* (medium) adopted for the *Marana* technique, numerous methods have been suggested by the Acharyas.

Therapeutic Uses of *Pittala Bhasma*:

Acharyas have mentioned *Pittala* to be *Tridoshahara*. *Pittala*, a *Mishra Loha* has tremendous potential for combating a broad spectrum of ailments. Some therapeutic use of *Pittala* mentioned in Classical texts is *Shodhana, Panduroghara, Krimighna, Naatilekhana, Pliharoga Nashaka, Raktapittanuta, Lekhana, Bal-virya-ayuvardhana, Jantughna, Kushthaghani, Basti Vishodhana*. These therapeutic purposes illustrate that *Pittala* was utilized and is currently used as a remedy for an extensive spectrum of maladies.

Formulations

Apparently, a fairly limited number of formulations of *Pittala* can be witnessed in traditional literature.

Table 3. The formulations of *Pittala* in various Classical Texts

Name of The Formulation	Reference	Ingredients	Indications
Pittala Rasayana	Rasa Ratna Samuchchya [27], Rasa Tarangini [28], Rasayana Sara [29]	*Pittala Bhasma, Kantaloha Bhasma, Abhraka Satva Bhasma, Vidanga, Sunthi, Pippali, Maricha, Tila, Ajmoda, Chitraka, Shudha Bilva, Palash Beeja.*	*Shweta Kustha, Agnimandya, Aamadosha, Shoola, Keeta*
Meghnada Rasa	Rasa Jala Nidhi [30]	*Shudha Parada, Shudha Gandhaka, Kamsya Bhasma, Pittala Bhasma, Tamra Bhasma.*	*Jwara*
Ratna Prabha Vati	Bhaisjyaratnawali [31]	*Swarna Bhasma, Mauktika Bhasma, Abhraka Bhasma, Naga Bhasma, Vanga Bhasma, Pittala Bhasma, Swarnamakshika Bhasma, Rajata Bhasma, Vajra Bhasma, Loha Bhasma, Haratala Bhasma, Kharpar Bhasma, Kadli, Kakmachi, Vasa, Utapala, Jayanti Swarasa, Karpura.*	*Stri-Roga, Balya, Vrishya, Rasayana.*
Shadanan Rasa	Rasa Jala Nidhi [32]	*Pittala Bhasma, Kansya Bhasma, Tamra Bhasma, Shudha Hingula, Pippali Churna, Shudha Vatsnabha, Guduchi Swarasa.*	*Sarwa Jwarantaka*
Ekadashayas Rasa	Bhaisajyaratnawali [33]	*Loha, Parade, Tamra, Kasis, Gandhaka, Abhraka, Pukhraja, Manikya, Pittala, Naga, Vidanga, Triphala, Hingu, Yavani, Jeeraka, Sajjikshara, Manashila, Vacha, Maricha, Chavya, Chitraka, Shunthi Drava.*	*Snayu Roga*
Swarna Sindooram	Bhaisajyaratnawali [34]	*Swarna Sindoor, Abhraka Bhasma, Mauktika Bhasma, Swarna Makshika Bhasma, Vaikranta Bhasma, Vanga Bhasma, Loha Bhasma, Pittala Bhasma, Pravala Bhasma, Shudha Shilajeet. Samudraphen, Guggulu, Gandhaka, Chitraka Mool Swarasa/Kwatha.*	*Anadavata, Aantravridhi, Mutrakricha, Urusthambha.*

Brass and its Metallurgy

Brass is an alloy of copper and zinc, in proportions that can be varied to achieve varying mechanical, electrical, and chemical properties [35]. It is a substitutional alloy: atoms of the two constituents may replace each other within the same crystal structure. Brass is similar to bronze, another alloy containing copper that uses tin instead of zinc [36].

Both bronze and brass may also include small proportions of a range of other elements including arsenic, lead, phosphorus, aluminium, manganese, and silicon. Brass has also been used to make utensils due to its properties such as having a low melting point, high adaptability, durability, and electrical and thermal conductivity.

Properties:

Brass is more malleable than bronze or zinc. The relatively low melting point of brass and its flow characteristics make it a relatively easy material to cast.

Density: 8.4 to 8.73 g/cm^3 (0.303 to 0.315 lb/cu in) [37]

Melting Point: 900 to 940 ° C / 1,650 to 1,720 ° F, depending on composition.

Table 4. Types of Brass

Class	Proportion by weight (%)	
	Copper	Zinc
Alpha brass	>65	<35
Alpha-beta Brass	55-65	35-45
Beta Brass	50-55	45-50
Gamma Brass	33-39	61-67
White Brass	<50	>50

A large number of independent studies confirm the antimicrobial effect of Brass, even against antibiotic-resistant bacteria such as MRSA and VRSA. The mechanisms of antimicrobial action by copper and its alloys, including brass, are the subject of intense and ongoing investigation. [38]

DISCUSSION

Pittala is an alloy of *Tamra* (Copper) and *Yashada* (Zinc) and is one of the *Mishra Loha.* Although *Pittala* is well known since the Samhita period, its internal use was seen in the medieval period. *Pittala,* one of such metals has been advocated in the management of innumerable diseases. Metals and minerals are integral parts of therapeutics in Ayurveda. In our classics, *Pittala Bhasma* has been indicated in *Pandu* (Anemia), *Krimi* (Microbial Infestation), *Raktapitta* (Bleeding Disorders), *and Kushtha* (Skin diseases). On analyzing various Classical Rasa Shastra texts, a few formulations of *Pittala* namely, *Pittala Rasayana, Meghnada Rasa, Ratna Prabha Vati, Shadanan Rasa, Ekadashayas Rasa & Swarna Sindooram* were quoted. The texts that had the particulars about these formulations were Rasa Jala Nidhi, Rasa Ratna Samuchchaya, Rasa Tarangini, Bhaisajya Ratnawali, and Rasayana Sara. The *Anupana* used for *Pittala Rasayana, Shadanan rasa & Ekadashayas Rasa* is *Madhu* (Honey). While Acharyas prescribed *Ratna Prabha Vati* to be consumed with either *Bala moola kwatha* (decoction of *Sida cordifolia*), *Ushna Dugdha* (Cow Milk), *or Bhringraja Swarasa* (decoction of *Eclipta alba*). As to a thorough assessment of diverse sources, *Krimighna, Kushthaghna*, and *Raktpittnuta* were the most ubiquitous and significant therapeutic indications for *Pittala.* Typically, minerals and metals are processed as *Bhasma.* There are multiple stages in the preparation of a *Bhasma*, encompassing *Shodhana*, *Bhavana*, and *Marana.* After *Bhasmikarana,* the macro-sized metals and minerals transform into micro-sized *Bhasma. Pittala Bhasma* prepared after enduring these processes is therapeutically valuable because of its nano-crystalline structure. The small particle size of *Pittala Bhasma* helps it to interact with the body at the molecular level. The bioavailability of *Bhasma* is enhanced even at lower doses owing to its substantially decreased particle size. Antibacterial properties of brass have been observed for centuries, particularly in marine environments while it prevents biofouling. Depending upon the types of concentration of pathogens and the medium they are in, brass kills microorganisms within a few minutes to hours of contact. Thus, formulations of *Pittala* can be utilized in a number of diseases.

CONCLUSION

This review is the compilation of information about *Pittala* compiled from different classical Rasa Shastra Texts**.** *Pittala* (Brass) and *Varta Loha* (Bronze) were known in the later Vedic period, especially Bronze Age. On reviewing the text, no or very little research information was quoted in regard to *Pittala*. *Tamra* and *Yashada* being the component of *Pittala* is widely used for making *Bhasma.* Undoubtedly, the *Bhasma* of *Pittala* might be easy to prepare compared to Tamara, but there is no research study done on the Pharmacological evaluation of *Pittala Bhasma*. *Pittala* could be a good substitute for *Tamra Bhasma* because it is convenient to formulate. Moreover, it is mild in temperament than *Tamra.*

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