

Therapeutic potentials of *Tamra* (copper) and its alloys A review through *Brihatrayi*

Review article

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Abstract

Metals and minerals are known to man since human civilization and became integral part of Ayurvedic therapeutics. *Tamra* (copper) and its alloys (*Pittala* and *Kamsya*) are one among such metals. They are emphasized throughout classical literature for various therapeutic and non therapeutic purposes. A number of formulations are found in *Brihatrayi* in contexts like internal administration, external application, utilization in the preparation of instruments and other purposes. Formulations of *Tamra* are recommended in diseases like *Hicca* (hiccup), *Swasa* (respiratory distress), *Pipasa* (Thirst), *Visha* (Poison) and *Pandu* (Anemia) etc. In the current review, an attempt has been made to compile all such references of copper and its alloys referred in *Brihatrayi*.

Key words: Brihatrayi, Caraka, Copper, Kamsya, Pittala, Tamra

Introduction:

Ayurvedic system of medicine is the most ancient medical science of the world. It is a stream of knowledge coming down since generations to generations and well-documented through series of books. Metals and minerals are an inseparable part of therapeutics in this system. Initially their use was limited for non-therapeutic purposes such as preparation of instruments, manufacturing of containers and other livelihood instruments etc. Their therapeutic use was increased during the period of *Rasashastra* and became integral part of Ayurvedic therapeutics due to their

additional advantages like lesser doses, quick action etc.(1) *Tamra* (copper) is one such metals mentioned with wide range of therapeutics. Though wide therapeutic utility of *Tamra* was increased with advent of *Rasashastra*, references pertaining to *Tamra* can be traced back to ancient literature. Ample of *Tamra* utilization references are found in *Brihatrayi* for internal administration, external applications, preparation of equipments and other purposes etc. Unfortunately, this information is scattered in the classics. Considering this, reference of *Tamra* and its alloys available in *Brihatrayi* are compiled and grouped into categories with an intension to provide focus on therapeutic and non-therapeutic usage of them. The categories are as under:

- Utilization in therapeutics
 - Internal administration
 - External application
- Utilization in the preparation of instruments/equipments

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➤ Other purposes etc.

Materials:

Brihatrayi (*Caraka Samhita*, *Sushruta Samhita* and *Astanga Hridaya*) with their commentaries are screened to compile references of copper and its alloys.

Results and observations:

Classification:

Caraka placed *Tamra* under mineral group (*Parthiva*) as one of six metals.(2) In *Sushruta Samhita*, *Tamra* is described in a group with other metals under the main heading as ‘*Trapvadi Gana*’. Pharmacological properties and actions are clearly mentioned. *Vagbhata* mentioned *Tamra* as one of *Lekhana Putapaka Dravya*.(3) *Astanga Hridaya* include *Kamsya* under *Tikta Skandha*.(4)

Synonyms:

Caraka uses the term *Arka* in few places which clarifies by *Chakrapani* as synonymous with *Tamra*.(5) *Sushruta* uses the term *Audumbara* for *Tamra*.

Pharmacological action:

Sushruta discussed pharmacological actions of *Tamra* like astringent (*Kashaya*) and sweet taste (*Madhura*), cold in potency (*Sheeta Virya*), scarificant (*Lekhana*) and laxative property (*Sara*).(6) *Kamsya* is slightly bitter, scarificant, good for vision and mitigates *Kapha* and *Vata*.(7)

Specific Precaution:

Direct reference providing safety aspects during therapeutic use of copper and its alloys is not available but seen

Chakrapani emphasized to provide safety aspects of utilizing metals and minerals that have been properly incinerated in appropriate doses. Otherwise they manifest number of adverse reactions (*Dushparinamam*).(8)

Tamra in Caraka Samhita

Formulations of *Tamra* are advocated for internal administration in conditions like *Hicca* (hiccup), *Swasa* (respiratory distress) etc.(9) He advocated *Tamra Curna* to eliminate unabsorbed poison from *Koshta* (abdominal cavity).(10) *Caraka* used *Tamra* as one of the main ingredient in many *Rasayana* formulations like *Brahma Rasayana-II*(11), *Apara Indrokta Rasayana*(12) etc. *Tamra* is also an important ingredient of formulations for topical applications. Formulations like *Anjana*, *Varti* and *Curna* etc. with copper as an ingredient are mentioned in classic. *Caraka* emphasized its use in *Lepa* and *Curna* forms in the treatment of *Kushta* (Skin disorders), *Granthi* (Abscess).(13, 14) *Varti* prepared with the powder of copper in combination of other drugs is advocated in eye diseases.(15) Copper container is preferred in preparation of *Dristiprada Varti*.(16) *Tamra* is also used in preparing equipments like *Jivha Nirlekhana Yantra* (tongue scrappers), *Vasti Netra* (Nozzle of enema pot) and *Patra* (containers) etc.(17, 18, 19) Along with therapeutic attributes, he quoted *Tamra* as poison in reference to simile for disrespect of quack.(20) The references mentioned in *Caraka Samhita* that hold *Tamra* as one of active metallic constituent are listed in Table 1.

Table-1 Therapeutic utilization of Tamra in Caraka Samhita

Sr.No	References	Formulation	Therapeutic uses
Utilization in therapeutics: internal administration			
1	<i>Charaka Chikitsa</i> 1-1/58	<i>Brahma Rasayana-II</i>	<i>Rasayana</i> (Rejuvenator)
2	<i>Charaka Chikitsa</i> 1-4/22	<i>Apara Indrokta Rasayana</i>	-do-

3	<i>Charaka Chikitsa</i> 17/126	<i>Muktadi Curna</i>	<i>Hicca</i> (hiccup), <i>Swasa</i> (respiratory distress)
4	<i>Charaka Chikitsa</i> 23/239	<i>Curna Yoga</i>	<i>Visha hara</i> (Anti-poisonous)
Utilization in therapeutics: external administration			
5	<i>Charaka Chikitsa</i> 7/85	<i>Lepa Yoga</i>	<i>Kushta</i> (Skin disorders)
6	<i>Charaka Chikitsa</i> 21/131	<i>Curna Yoga</i>	<i>Granthi</i> (Abscess)
7	<i>Charaka Chikitsa</i> 26/246	<i>Shankhadi Varti</i>	Collyrium for <i>Akshi Roga</i> (Eye disorders)
Utilization in therapeutics: equipment/instruments			
8	<i>Charaka Sutra</i> 5/74	<i>Jivha Nirlekhana Dravya</i>	Tongue scrapper
9	<i>Charak Chikitsa</i> 7/117	<i>Tamra Bhajana</i>	Copper containers
10	<i>Charak Chikitsa</i> 7/117	<i>Tamra Bhajana</i>	Copper containers
11	<i>Charak Chikitsa</i> 26/255	<i>Tamra Bhajane</i>	Copper containers
12	<i>Charaka Siddhi</i> 3/7	<i>Vasti Netra Karnika Dravya</i>	Nozzle of enema pot
Other purposes			
13	<i>Charaka Sutra</i> 1/131	<i>Visha Kwathita Tamra</i>	Simile for disrespect of Quack

Tamra in Sushruta Samhita

Trapvadi Gana is specially attributed to cure number of conditions like *Pipasa* (Thirst), *Visha* (Poison), *Pandu* (Anemia) etc.(21) *Tamra* is mentioned to be one of the *Lekhana Putapaka Dravya* (drug used for scrapping).(22) Seer emphasized anti diabetic activity of *Tamra* in combination with other metals and decoction of *Salasaradi Gana*.(23) *Sushruta* used *Tamra* in many forms like *Anjana*, *Varti*, *Gutika* and *Rasakriya* to treat eye disorders. If the base of *Arbuda* (tumor) is small, it can be kept encircled with *Tamra Patti* (thin sheet of copper).(24) Wounds of *Upadamsha* (gonorrhoea) are treated with sprinkling of *Tamra Curna* along with other herbal powders.(25) Different *Shalakas* (probes) for application of collyrium in different eye disorders were prepared from *Tamra*.(26) Vessels made of copper are advocated in different pharmaceutical procedures for preparation and storage of medicines. He clearly said that water stored in vessels made up of copper, bronze, gold and precious stones should be used for drinking. It is said to be best in treating *Paittika* disorders.(27) The references mentioned in *Sushruta Samhita* that hold *Tamra* as one of active metallic constituent are listed at Table 2.

Table 2 Therapeutic utilization of Tamra in Sushruta Samhita

Sr.No	References	Formulation	Therapeutic uses
Utilization in therapeutics: internal administration			
1	<i>Sushruta Sutra</i> 38/62	<i>Trapvadi gana</i>	<i>Pipasa</i> (Thirst), <i>Visha</i> (Poison), <i>Pandu</i> (Anemia)
2	<i>Sushruta Chikitsa</i> 12/10	<i>Shalasaradi Avaleha</i>	<i>Mehahara</i> (Anti diabetic)
Utilization in therapeutics: external administration			
3	<i>Sushruta Chikitsa</i> 18/38	<i>Tamra Patti</i>	<i>Arbuda</i>
4	<i>Sushruta Chikitsa</i> 19/47	<i>Tamra Curna</i>	<i>Vridhhi</i> (inguino-scrotal enlargement), <i>Upadamsha</i> (gonorrhoea) and <i>Shlipada</i> (elephantiasis)
5	<i>Sushruta Uttara</i> 11/6	<i>Anjana Varti</i>	Collyrium for <i>Akshi Roga</i>

6	<i>Sushruta Uttara</i> 12/13	<i>Vartyanjana</i>	(Eye disorders) Collyrium for <i>Akshi Roga</i>
7	<i>Sushruta Uttara</i> 12/29	<i>Anjana Yoga</i>	(Eye disorders) <i>Shukravaivarnya</i>
8	<i>Sushruta Uttara</i> 12/41	<i>Rasakriya</i>	(discoloration) Collyrium for <i>Akshi Roga</i>
9	<i>Sushruta Uttara</i> 12/46	<i>Anjana Yoga</i>	(Eye disorders) <i>Puyalasa</i> (acute dacryocystitis)
10	<i>Sushruta Uttara</i> 12/50	<i>Pratyanjana</i>	<i>Praklinnavartma</i>
11	<i>Sushruta Uttara</i> 15/26	<i>Curnanjana</i>	(conjunctivitis) <i>Arma</i> (Pterygium), <i>Sirajaala</i> (haemangioma)
12	<i>Sushruta Uttara</i> 18/24	<i>Lekhana Putapaka</i> <i>Dravya</i>	<i>Lekhana Putapaka</i> (scraping)
13	<i>Sushruta Uttara</i> 18/85	<i>Curnanjana</i>	<i>Anjana</i> (Collyrium) for eyes in healthy person
14	<i>Sushruta Uttara</i> 18/101	<i>Gutikanjana</i>	<i>Kandu</i> (itching), <i>Shuklarma</i> (pinguecula), <i>Timira</i> (blurred vision)
15	<i>Sushruta Uttara</i> 19/15	<i>Gutikanjana</i>	<i>Kukunaka</i> (ophthalmia neonatorum)
Utilization in therapeutics: equipment/instruments			
16	<i>Sushruta Sutra</i> 45/13	<i>Tamra Paatra</i>	Copper container
17	<i>Sushruta Sutra</i> 46/451	<i>Tamra Paatra</i>	Copper container
18	<i>Sushruta Chikitsa</i> 9/23	<i>Tamra Deep</i>	Copper lamp
19	<i>Sushruta Chikitsa</i> 29/13	<i>Tamra Paatra</i>	Copper container
20	<i>Sushruta Chikitsa</i> 35/11	<i>Vasti Netra</i>	Nozzle of enema pot
21	<i>Sushruta Chikitsa</i> 40/25	<i>Tamra Paatra</i>	Copper container
22	<i>Sushruta Uttara</i> 12/40	<i>Tamra Paatra</i>	Copper container
23	<i>Sushruta Uttara</i> 12/49	<i>Tamra Kapala</i>	Piece of copper
24	<i>Sushruta Uttara</i> 12/53	<i>Tamra Ghata</i>	Copper container
25	<i>Sushruta Uttara</i> 17/85	<i>Tamra Shalaka</i>	Copper probe
26	<i>Sushruta Uttara</i> 17/97	<i>Tamra Paatra</i>	Copper container
27	<i>Sushruta Uttara</i> 18/61	<i>Tamra Paatra</i>	Copper container
28	<i>Sushruta Uttara</i> 18/63	<i>Audumbari Shalaka</i>	Copper probe
29	<i>Sushruta Uttara</i> 18/104	<i>Tamra Paatra</i>	Copper container
30	<i>Sushruta Uttara</i> 42/105	<i>Tamra Paatra</i>	Copper container
31	<i>Sushruta Sutra</i> 26/20	<i>Tamra Shalya</i>	Copper instrument

Tamra in Astanga Hridaya

Tamra in the form of *Anjana*, *Varti*, *Gutika* etc. are used to treat many eye disorders. *Mahanila Gutika* is used to treat corneal opacity (*Shukra*).⁽²⁸⁾ Copper vessels and containers are prescribed for preparation and storage of medicines.⁽²⁹⁾ He also advocated use of copper to remove unabsorbed poison from *Koshta*.⁽³⁰⁾ *Tamra* is used along with other ingredients in *Dhupa Yoga* (fumigation) to relieve friction and severe pain.⁽³¹⁾ The references mentioned in *Astanga Hridaya* that hold *Tamra* as one of active metallic component are listed at Table 3

Table 3 Therapeutic utilization of Tamra in Astanga Hridaya

Sr.No	Reference	Description	Probable translation
Utilization in therapeutics: internal administration			
1	<i>Astanga Hridaya Sutra 7/27</i>	<i>Curna Yoga</i>	<i>Visha hara</i> (Anti-poisonous)
Utilization in therapeutics: external administration			
2	<i>Astanga Hridaya Sutra 24/15</i>	<i>Lekhana Putapaka Dravya</i>	<i>Lekhana Putapaka</i> (scraping)
3	<i>Astanga Hridaya Uttara 9/32</i>	<i>Varti</i>	<i>Kukunaka</i> (ophthalmia neonatorum)
4	<i>Astanga Hridaya Uttara 11/5</i>	<i>Curnanajana</i>	<i>Puyalasa</i> (acute dacryocystitis)
5	<i>Astanga Hridaya Uttara 11/35</i>	<i>Varti</i>	<i>Shukra</i> (corneal injury)
6	<i>Astanga Hridaya Uttara 11/39</i>	<i>Mahanila Gutika</i>	<i>Shuddha Shukrahara</i> (corneal opacity)
7	<i>Astanga Hridaya Uttara 13/45</i>	<i>Curnanajana</i>	<i>Sarvadrakamaya</i> (all eye disorders)
8	<i>Astanga Hridaya Uttara 13/74</i>	<i>Varti</i>	<i>Timira</i> (blurred vision)
9	<i>Astanga Hridaya Uttara 14/31</i>	<i>Pindanjana</i>	<i>Collyrium</i> for <i>Akshi Roga</i> (Eye disorders)
10	<i>Astanga Hridaya Uttara 16/7</i>	<i>Muti</i>	<i>Akshi Roga</i> (Eye disorders)
11	<i>Astanga Hridaya Uttara 16/34</i>	<i>Dhupa Yoga</i>	<i>Vedanaghnām</i> (Pain)
12	<i>Astanga Hridaya Uttara 16/34</i>	<i>Anjana Yoga</i>	<i>Akshi Roga</i> (Eye disorders)
13	<i>Astanga Hridaya Uttara 16/35</i>	<i>Dhupa Yoga</i>	<i>Akshigharsha, Akshi Vedana</i>
14	<i>Astanga Hridaya Uttara 16/41</i>	<i>Gutika yoga</i>	<i>Gharsha, Ashru, Shopha, Kandu</i>
15	<i>Astanga Hridaya Uttara 16/43</i>	<i>Dhupa Yoga</i>	<i>Shopha, Vedana</i>
16	<i>Astanga Hridaya Uttara 16/54</i>	<i>Varti</i>	<i>Pilla, Shukra</i>
17	<i>Astanga Hridaya Uttara 16/56</i>	<i>Curnanajana</i>	<i>Pilla, Pakshmathata</i>
Utilization in therapeutics: equipment/instruments			
18	<i>Astanga Hridaya Chikitsa 19/73</i>	<i>Tamra Bhajana</i>	Copper container
19	<i>Astanga Hridaya Uttara 9/20</i>	<i>Tamre</i>	Copper container
20	<i>Astanga Hridaya Uttara 11/40</i>	<i>Tamra Bhajana</i>	Copper container
21	<i>Astanga Hridaya Uttara 16/7</i>	<i>Tamrastha</i>	Copper container
22	<i>Astanga Hridaya Uttara 16/35</i>	<i>Tamre</i>	Copper container
23	<i>Astanga Hridaya Uttara 16/37</i>	<i>Tamra Sampute</i>	Copper container

24	<i>Astanga Hridaya Uttara</i> 16/49	<i>Tamre</i>	Copper container
25	<i>Astanga Hridaya Uttara</i> 16/55	<i>Tamre</i>	Copper container

Pittala (Brass)

Pittala, an important *Mishra Loha* (alloy) is familiar as brass. It is made up of copper and zinc in 2:1 proportion.(32) It is known since *Samhita Kala*, utilized in the preparation of different instruments for various procedures. *Caraka* used this metal to prepare *Jivha Nirlekhana Yantra* and *Vasti Netra*.(33) No reference pertaining to *Pittala* was found in *Astanga Hridaya*. Very few references in *Brihatrayi* that hold *Pittala* as one of active metallic component are compiled at Table 4.

Table 4: Depicting references of *Pittala* for different purposes

Sr.No	Reference	Description	Probable translation
1	<i>Caraka Sutra</i> 5/74	<i>Jivha Nirlekhana Dravya</i>	Tongue scrapper
2	<i>Caraka Siddhi</i> 3/7	<i>Vasti Netra Karnika Dravya</i>	Nozzle of enema pot
3	<i>Sushruta Sutra</i> 26/20	<i>Shalya</i>	Foreign body
4	<i>Sushruta Chikitsa</i> 35/11	<i>Vasti Netra</i>	Nozzle of enema pot

Kamsya (Bronze)

Kamsya, another important *Mishra Loha*, made up of copper and tin (8:2) known since the period of *Samhita Kala*.(34) It is known as bell metal or bronze. In *Brihatrayi*, *Kamsya* was used to prepare *Vasti Netra*, *Kamsya* utensils were used in different pharmaceutical procedures and for storage of medicines. *Sushruta* used this metal as *Taapa Sweda Dravya* (35) and *Murdha virechana Dravya*.(36) Few references in *Brihatrayi* that hold the *Kamsya* as one of active metallic component are compiled at Table 5.

Table 5: Depicting references of *Kamsya* for different purposes

Sr.No	Reference	Description	Probable translation
1	<i>Caraka Sharira</i> 8/9	<i>Kamsya Patra</i>	Containers of bronze
2	<i>Caraka Siddhi</i> 3/7	<i>Vasti Netra Karnika Dravya</i>	Nozzle of enema pot
3	<i>Caraka Chikitsa</i> 24/154	<i>Kamsya Bhajana</i>	Vessels and containers
4	<i>Sushruta Sutra</i> 20/14	<i>Kamsya Bhajana</i>	Vessels and containers
5	<i>Sushruta Sutra</i> 45/13	<i>Kamsya</i>	Bronze vessel for drinking water
6	<i>Sushruta Chikitsa</i> 18/36	<i>Kamsyanila</i>	Blue rust of bronze
7	<i>Sushruta Chikitsa</i> 32/4	<i>Taap sweda Dravya</i>	Dry heat application
8	<i>Sushruta Uttara</i> 4/9	<i>Kamsyabha</i>	Luster of <i>Kamsya</i>
9	<i>Sushruta Uttara</i> 12/14	<i>Kamsya Mala</i>	By product of <i>Kamsya</i>
10	<i>Sushruta Uttara</i> 12/41	<i>Kamsya Mala</i>	By product of <i>Kamsya</i>
12	<i>Sushruta Uttara</i> 12/50	<i>Kamsya Mala</i>	By product of <i>Kamsya</i>
13	<i>Sushruta Uttara</i> 18/61	<i>Anjana Paatra</i>	Vessel for collirium
14	<i>Sushruta Uttara</i> 26/28	<i>Murdha virechana Dravya</i>	Categorized under <i>Murdha Virechana</i>
15	<i>Astanga Hridaya Sutra</i> 7/37	<i>Kamsya Patra</i>	Bronze container

16	<i>Astanga Hridaya Sutra 10/29</i>	<i>Tikta Skandha Dravya</i>	Categorized under <i>Tikta skanda</i>
17	<i>Astanga Hridaya Uttara</i> 16/38	<i>Kamsya Patra</i>	Bronze container

Discussion:

Screening of classics of *Brihatrayi* gives clear idea that *Tamra* and its alloys were used to treat many pathological manifestations. Though, the use of metals and minerals in therapeutics was increased after the development of *Rasashastra* but roots of this science can be traced back to *Brihatrayi*. *Caraka* considers *Tamra* under *Parthiva* category. Formulations of *Tamra* are recommended in diseases like *Hicca* (hiccup), *Swasa* (respiratory distress), *Pipasa* (Thirst), *Visha* (Poison) and *Pandu* (Anemia) etc. *Caraka* used fine powder of copper to remove poison from *Koshta*. *Chakrapani* clarifies that non incinerated copper should be used for that purpose because of its emesis activity. Fine powders of these metals were prescribed for internal administration and external applications. Fine powders were used externally in *Kushta*, *Vridhhi* and *Granthi*. *Tamra* is said to have *Pittahara*, *Kaphahara* property.

Modern science also proves antimicrobial(37) and fungicidal(38) activity of copper and its alloys surfaces. They also conclude that copper has potential application as an inhibitory agent in the various stages of the food processing operations. This may be the reason for seers advocating use of vessels and containers made of these metals in preparation and storage of medicines. It makes clear that such metals has special role in different clinical conditions. They have made their unique place in Ayurvedic pharmacopoeia and became integral part of Ayurvedic therapeutics.

Conclusion:

Reviewing of *Brihatrayi* classics reveals that Ayurveda utilized copper and its alloys extensively for therapeutic and

non-therapeutic purposes. Fine powders of these metals were used for both internal administration and external application. Seers advocated using of copper vessels and containers in different pharmaceutical procedures. Though pharmaceutical aspect of these metals is not well explained in *Brihatrayi*, indirect references for their purification, incineration infers that one should be cautious while using such metals. This work is anticipated to be handy for referring the utilization of copper emphasized in ancient Indian literature and reduces the sternous efforts of researchers to gather information. This also emphasizes the frequency of metal used in different conditions.

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