

A REVIEW ON TAMRA (COPPER) THROUGH AYURVEDIC TEXTS WITH A BRIEF ON ITS ROLE IN SKIN DISORDERS

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ABSTRACT

Rasashastra is the branch of *Ayurveda* dealing with metals and minerals. The main concept of *Rasashastra* is generally referred to *Dhatuvada* (Alchemy) with a view to remove poverty from the world but also for *Dehavedha* (for the body) which makes the body very strong, free from diseases and stable for longer duration. Through a period of various centuries *Dhatuvada* and *Dehavedha* has been achieved which is evident from the vast literature available on *Rasashastra*. The *Rasaausadhis* are the back bone of the *Ayurvedic* therapeutics. It is chiefly based on metals and minerals, small doses, tastelessness, quick action, effectiveness. *Rasayana* property makes *Rasaausadhis* more popular and superior over the other medicines and this attracts the attention of patients as well as pharmaceutical manufacturers. The number of metals found in the world throughout is innumerable but only few of them have recognized to present medicinal values. And among these *Dhatu* (metals) includes *Tamra* (copper). In this study the classical texts of *Ayurveda* were searched for a detailed description on *Tamra* and its therapeutic potentials as mentioned in our classical *Ayurvedic* texts with a brief on its action in skin disorders through searching and analyzing *Ayurvedic* as well as the modern perspective.

Keywords: *Tamra* (Copper), *Dhatu*, skin disorders

INTRODUCTION

The number of metals found in nature is abundant. But only a few of them are recognized to possess medicinal properties. According to ancient scholars all these metals were termed under *Dhatu* (metal). *Dhatu* is useful for the human beings to relieve the wrinkles on the face, graying of hair, baldness, emaciation, weakness, advancement of ageing, fever and other diseases¹. And one of these includes the *Tamra* (copper). The word *Tamra* indicates a substance which is capable of causing giddiness, when consumed in impure form. The word also implicates that it is desired by people for preparation

of precious metals like gold i.e. '*Dhatuvaada*'. Being a *Dhatu* it is *Taijasiya Dravya* i.e. it is mainly constituted from *Teja Mahabhoot*. The word *Dhatu* is used synonymously with *Lauha*. It comes from root 'dha' meaning 'to support'. *Dhatu* means a substance which is capable of removing *valee*, *palitya*, *khaalitya*, *kaarshya*, *jaraa* and other diseases.² *Loha* or *lauha* has been derived from the word 'luh' which denotes forcible extraction of a metal from its ore.

Lauha means a substance which is capable of expelling or removing vitiated *dosha* and disease from the body³. There is little

difference between meanings of Dhatu and Loha. The ores from which metals are extracted, can be called as Loha whereas the word Dhaatu denotes a metal. Rasashastra is the branch of Ayurveda in which the unique feature of these metallic preparations has been mentioned.

Aims And Objectives : The present paper is a compilation holding references pertaining to Tamra as mentioned in our classical texts and modern science. The role of Tamra as mentioned in classical Ayurvedic texts with a brief on its role in skin disorders.

Material And Methods : References from various Rasashastra Granthas, Ayurvedic treatises.

The Charaka Samhita, Sushruta Samhita, Ashtanga Hridaya and Ayurveda rasashastra and bhaishajyakalpana text-books were scrutinized for their references. Articles related to skin disorders from Ayurveda and Contemporary science. Conceptual analysis was done for the proper understanding.

History of Tamra : Copper in Indian Literature: The word Dhatu is used synonymously with Lauha. It comes from root 'dha' meaning 'to support'. Dhatu means a substance which is capable of removing vales, palitya, khaalitya, kaarshya, jaraa and other diseases⁴. Loha or Lauha has been derived from the word 'luh' which denotes forcible extraction of a metal from its ore. Lauha means a substance which is capable of expelling or removing vitiated doshas and diseases from the body⁵.

Historical review of Tamra: Copper in Indian Literature:

a) Vedic kala: In ancient India, Copper Age and Iron Age followed Stone Age. Copper Age was predominant in northern India. This is reflected from ancient Vedic Literature.

Tamra is used since Rigved period. It was called as Ayas. Tamra was used as ornaments utensils, weapons etc. Yajurveda opine Loha as Tamra and Shyama as Ayas because while explaining Rajata, Swarna etc. Loha colourminics as Tamra Varna i.e. Aruna or Babru Varna which are found in Tamra and not in Ayas. Atharvaveda explains Tamra as one among the 3 lohas i.e. Tamra, Kamsya & Pittala which were used for ornaments & also Tamra Suchi is mentioned. The word lohitayas is found in Atharvaveda and Shatapatha Brahman for tamra. Initially the word tamra and lohitayas both were used for tamra but gradually the term tamra became more popular. In Shuklayajurveda then word seesa is also used in some places instead of tamra. In Brahmana Grantha, Tamra Mudra was used because Tamra was Mridu and can be moulded to any shape if necessary. In Grihya Sutra, Tamra was termed as Suryaloha and Tamra for Yantra Nirmana was in practice. In Dharma Sutra, Tamra was considered as Pavitra. Gautamadi Rishi made a rule for Yajna that the vessels should be of Tamra this is most sacred.

Puranas:

In Varah Purana – Tamra Utpatti is explained.

In Devi Bhagavata – Common man used Tamra.

Smriti Yuga: In Manu Smriti for measurements like Karsha, Para etc. use of only copper vessels is explained.

a) Samhita Kala:

Charak Samhita: Charak has mentioned Tamra along with six other metals in Bhauma Aushadha i.e. medicines obtained from earth⁶.

Sushrut Samhita: has classified Tamra with other metals in 'Trapvaadi Gana' and gives its indications in krimi, Pandu and Prame-

ha⁷. Tamra churna is being indicated in Upadansha, Abhishyanda.

AshtangaSamgraha: AshtangaSangraha uses Tamra in number of ways, similar to that of CharakSamhita. Here the medicinal properties gunas of Tamra are enlisted for the first time⁸.

AshtaangaHrudaya: The pots made of Tamra are used to store medicines especially, 'Anjana'. In UttaraSthana of AshtangaHrudaya, different medications in the form of Anjana containing Tamra for external application have been mentioned in NetrarogaChikitsa.

SharangadharSamhita: Methods of Shodhana and Maarana of Tamra are described.

ArkaPrakasha: While separating the Arka of Vishas, if TamraPatra is to be used, then it should be coated with thin layer of tin internally⁹.

RasahrudayaTantra describes the varieties of Tamra in detail.

RasendraChudamani describes the pharmacological action of Tamra, its shodhan and Maran and its use in *Paandu*, *Arsha* and *NetraRoga*.

RasaprakaashSudhaakara also describes types of Tamra. It's *Shodhan*, *Maran* and therapeutic use.

Rasaratnasamucchaya describes two varieties of Tamra along with good and bad types – process of *Shodhan* and *Maran* and also preparation of *SomnathiTamraBhasma* by *Garbhyantra* is described.

RasendraChintamani has described the methods of *Shodhan*, *Maran* and *Amruteekarana* of Tamra.

Rasachintamani described the special method of preparation of white *TamraBhasma* (*TamraShweteekarana*).

AcharyaBindu described method of preparation of TamraBhasma without Parada.

Rasapaddhati has given the details of Tamra with special method of Marana without Mercury and its therapeutic indications.

AyurvedPrakaash and RasaTaranginee have described the process of Shodhan, Maran and Amruteekarana of Tamra.

Descriptions of Tamra in Rasagranthas:

a) Origin of Tamra according to ancient texts:

i) There is mythological story about genesis of Tamra in *VarahaPurana*. Tamra is said to have originated from the semen of *Kartikayawhich* fell on the earth¹⁰.

ii) According to *Rasakaamdhenu* and *brihatraajsundar*, Tamra had its origin from soorya¹¹.

b) Relation between graha and tamra¹² Tamradhatu is associated with sooryayagraha.

c) Specific colors of tamra¹³:

The natural colour of tamra is red.

d) Jvaalapariksha of tamra¹⁴:

Taamradhaatu produces bluish flame when on Fire.

e) Percentage of loss of Tamra on fire¹⁵

When. 10 Pala of taamra is subjected to Fire there is 5papa or 5% loss is observed in it.

f) Occurrence of Tamra:

Mineral sources: Tuttha, swarnamakshik

Animal sources: MayoorPiccaa (Peacock's feather) Bhunaaga (Earthworm)

g) Varieties of tamra:

According to *Rasaratnasamucchaya*, there are two types of Tamra based on the region where it is found

1) Nepaliya and

2) Mleccha

a) **Nepaliya Tamra¹⁶:** It is red in colour soft and more malleable. It is unctuous, pure and heavy. It is free from defects and impurities such as iron and lead. It is used in medicinal preparations.

Since it was imported from the country of Nepal, the name Neepaliya was derived.

- b) **Mlechha Tamra**¹⁷: It is blackish in colour. It is hard and less malleable. It is inferior in properties than the previous one. It turns black after cleansing in water. It is mixed with impurities such as lead and iron. It easily breaks and its lamina can be removed. It is light and dry. The Tamra obtained from the mines of Nepal is considered the best while that obtained from the mines of other places is considered inferior and not recommended for therapeutic uses.

On the basis of colour, Tamra is classified by Rasarnava³⁶ as

- a. Rakta, b. Krushna Out of these, Rakta Tamra is considered superior.

h) Graahayatva Agraahatva of Tamra¹⁸ - Snigdha- lustrous, Mrudu- soft, Ghana – heavy, Svaccha- clears from blemishes, Japakusumaprabham - red in color Lohanagadirahitam- devoid of impurities like iron lead etc as impurities and hence not recommended.

i) Properties of Tamra and actions of Tamra¹⁹

Rasa- tiktakashaya Madhuramla

Veerya- ushna

Vipaka -madhurKatu

Guna -Sara laghu

Karma- netryashodhana Deepanlekhanavishayakrutaamapachana

Action on dosha- shodhana (kapha, pittta)

Action on dhatu- raktaprasadana, maansamedalekhana

Action on mala- purisharanjana

Action on Vyaadhi- shoolapaanduudara- pleeharoga etc.

Action on Avayava: Netra, Yakrut, Pleeha, Aamashaya.

Shodhan of Tamra: A prime important processing known as *Tamra Shodhana* is a must as the available *Tamra* may have few adulterants, alloys, foreign bodies etc. in it which might cause ill effect. So by considering them most of the *Acharyas* have mentioned various *shodhana* processes.

Sodhana is of two kinds:

(1) *Samanya Sodhana*; 2) *Vishesh Sodhana*
A) Samanya Shodhana

i) All *Dhatus* are heated and quenched for 7 times successively in *Taila, Takra, Gomutra, Aranala and Kulattha Kwatha*²⁰.

ii) All *Dhatus* are heated and quenched for 7 times successively in *Taila, Takra, Gomutra, Konji and Ravidugda*²¹.

iii) All *Dhatus* are heated and quenched for 7 times in the following order as *Takra, Kanji, Gomutra, Tilataila and Kulattha Kwatha*²².

iv) All *Dhatus* heated and quenched for 7 times in *Kadalimoola Swarasa*²³.

b) Vishesh Shodhana of Tamra

As per the opinion of many *Rasacharaya*'s even after *Samanya Shodhana* it should be processed with *Vishesh Shodhana* for enhancing its properties.

The method for *vishesh shodhan* adopted in the present study requires *swedana* of copper sheets in *Gomutra*.

By processing with specific media or drugs specific *Dosha Nirharana* is been explained as mentioned herewith.

Historic review of copper – As a medicine in modern view:

The first recorded medical use of copper is found in the *Smith Papyrus*, one of the oldest books known. The *papyrus* is an Egyptian medical text, written between 2600 and 2200 B.C. which records the use of copper to sterilize chest wounds and to sterilize drinking water. Other early reports of copper's medicinal use are found in the *Ebres Papyrus*, written around

1500 B.C. The Ebers Papyrus documents medicine practiced in ancient Egypt and in other cultures that flourished many centuries earlier. Copper compounds were recommended for headaches, “trembling of the limbs” (perhaps referring to epilepsy or St. Vitus’ dance) burn wounds, itching and certain growths in the neck, some of which were probably boils. Forms of copper used for the treatment of disease ranged from metallic copper carbonate. It could also have been chrysocolla, a copper silicate or even copper chloride, which forms on copper exposed to seawater.

According to Modern:

Chemical Symbol – Cu

a) Physical properties²⁴

- i. **Colour:** Copper is a red coloured shining metal
- ii. **Specific gravity** is - 8.0 to 8.96 per cubic centimeter at 20. C & It is about 14 % heavier than iron.
- iii. **Hardness:** 2.5 to 3
- iv. **Melting point:** 1080 0 C - 1083.4. 0C
- v. **Boiling point:** 2325 0C
- vi. Good conductor of heat and electricity. The copper used in electric wire is highly pure.
- vii. Pure copper is highly malleable and can be rolled in to sheets less than 0.05m thick.

b) Chemical properties

Copper does not burn in air, but is gradually converted into cuprous (Cu₂O) & Cupric (CuO) Oxides on its surface when heated to redness. The finely divided metal will burn in chlorine or sulphur vapour. It does not react with steam at any temperature below white heat, & then only to a very slight extent copper is below hydrogen in the electro chemical series and hence does not react with acids unless they are also oxidizing agents, or from complex with ions with copper. It is how-

ever, slowly attacked by some acids in presence of air, owing to the slow oxidizing action of the air.

Although unaffected by dry air at the ordinary temperature, exposure to moist air causes the formation of a beautiful green coating or patina. This was for long said to be a basic copper carbonate, but Vernon & Whit by have shown that it is, in land places, a basic sulphate – CuSO₄ – 3Cu(OH)₂, while near the sea this is accompanied by a basic chloride – CuCl₂ – 2Cu(OH)₂

c) Alloys of Copper²⁵

Monal metal (Copper + Nickel + Iron 27:70:3)

Gun metal (Copper + Tin + Zinc) 88: 10: 02

Brass metal (Copper + Zinc) (60 – 90: 40 – 10) 2: 1

Occult metal (Copper + Zinc)

German silver (Copper + Zinc + Nickel) 50:25:25

Phosphor Bronze (Copper + Phosphor + tin) 85: 2(0.25-2.5) :13

Alluminium bronze (Copper + Alluminium + Tin + Nickel) 90:7:0.5: 2.5 (0-6)

Bronze (copper + Tin + Lead) 88-96: 4-12: 0.5

Bell metal (copper + tin) 80:20

d) Occurrence²⁶:

Native copper (Almost pure copper) rarely occurs in nature most comes from the following ores.

1. Oxides type ores – Cuprite, Tenovite.
2. Sulphides -- Chalcopyrite (CuFeS₂), Copper pyrite, Chalcocite, Copper glancebronite, Coussite (CuS), Crubelite.
3. Grey copper -- Tetrahedrite, Tenovite, Fomatinitite, Enargite
4. Sulphate -- Chalcantite (Cu₃ As S₃)
5. Carbonates – Malachite, Azurite (2CuCO₃ Cu COH₂)

6. Silicates -- Chrysocolla, diopside
7. Chloride -- Atacamite
8. Arsenates
9. Phosphates

e) Extraction²⁷

The actual operation is carried out in stages:

1. Concentration of the ore by flotation
2. Roasting of ore
3. Smelting production of matts
4. Conversion of matte to blister copper
5. Refining of blister Copper

This gives about 99.5% of Copper & is known as tough pitch Copper. If metal of very high purity is required then tough pitch copper is further refined by electrolysis. Electrolytic copper is 99.96 to 99.99 % pure.

f) Probable Mode of Action²⁸:

Copper is used by various enzymes in the body as a helper for the chemical reaction. The chemical reaction may involve creating energy, decreasing inflammatory response, blood clotting and so on. Below is an overview how copper is absorbed in to the body and how it is used.

I) Absorption of Copper

a) Copper is absorbed by the body at two main sites

- i) Small intestine
- ii) Stomach
- iii) The use of copper bracelets assumes that the skin can be the third site of constant copper absorption

II) Transport of absorbed Copper

Copper does not float through blood stream as a lone copper. But it is carried by the proteins like ceruloplasmin (specifically for copper), albumin (can carry many things including copper)

III) Copper storage

Copper is stored in proteins called metallothioneins

IV) Copper Elimination

It is eliminated almost entirely by the feces, also by the bile, urine, saliva & sweat.

V) Enzymes need for Copper

i) Enzymes are proteins specialized to assist in a chemical function

ii) Copper is needed by enzymes as a "helper" in a chemical reaction these functions makes copper essential for life.

a) Cytochrome C Oxidase (essential for energy production)

b) Super oxide dismutase (essential for protection against oxidative damage)

c) Dopamine hydroxylase (essential for adrenaline production)

d) Lysyl oxidase (essential collagen and elastin production)

e) Factor V enzyme (essential for blood clotting)

f) Ceruloplasmins (a carrier protein, but also aids in iron metabolism)

g) Also such other factors like growth hormone stimulation, as transcription factor in RNA etc.

VI) It is said that up to 100mgm may be taken per day without danger, & higher organisms appear to have to some extent immune to copper. Copper seems to be necessary to assist in the mobilization of iron in the body & in the formation of hb. Lower organisms are very sensitive to copper salts & traces are added to drinking water in America to destroy bacilli & algae. A solution of copper sulphate mixed with slaked lime is used as Bordeaux mixture as a fungicide²⁹.

VII) Of the above mentioned functions, copper has been mostly possess "anti-inflammatory, antibacterial, antifungal, antiviral, as well as the energy production property.

DISCUSSION

Antiquity of use of medicinal, pol-herbal, herbomineral, mineral based formulation for therapeutic and cosmetic purposes dates back to the *vedic* periods. Description of utility of various therapeutic and various topical applications have been mentioned and described in detail in our classical texts of *Ayurveda*. According to *yuktivyapashrayachikitsa*, the medicine can be administered by methods of treatment i.e. *antaparimarjana* (oral route), *bahirparimarjana* (topical applications) and *shastrapranidhana* (surgical intervention). This is a great contribution of *charaksamhita* while explaining *trividhachikitsa*. *Bahirparimarjana* is nothing but the topical application in the form of *taila*, *lepa*, *malahar*, *ghritachurna* etc. by *abhyanga*, *parisheka*, *udvartana* etc. this type of formulations are exclusively used in the treatment of skin disorders. Tamra (copper) has been in use since ages. Its use has also been mentioned in the ancient Egyptian culture. The first significant medical document known as *Kahunpapyrus* mentions the use of malachite – basic cupric carbonate for preparing a typical blue green eye makeup³⁰. This eye makeup was also used for prevention and cure of eye infections. Actually in this practice it may be possible to recognize the first empiric attribution of antiseptic properties to copper preparations. Tamra as per literary review is *tikta* and *katu* in *ras* and acts by its *Kaphapittahara* and *vatakaphaharagunas*, and its *lekhana* and *ropan karmas*. According to Research studies, copper-peptides, have been found to accelerate the regeneration and repair of many types of mammalian tissues. Repair process of cutaneous photodamage and as anti-inflammatory agents. Copper helps in reversing aging effects on skin (humans) - thickens skin, reduces small and large wrinkles, re-

duces blotchiness and blemishes, improves elasticity, and increases keratinocyte and fibroblast production and thickens the sub-cutaneous fat layer.

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