



AYURVEDIC ASPECT OF COPPER AND ITS CHRONIC TOXICITY

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ABSTRACT

Copper was known as a therapeutic agent to ancient Greeks and Romans. Exposure to copper occurs through both natural and anthropogenic sources. Human health in the past and present is influenced by the amounts and proportion of chemical elements to which humans have been exposed. Humans are exposed to copper

primarily from air, food and water. As the copper toxicant accumulate on cellular level after chronic and persistent exposure like cumulative poison (*Dushi visha*). There is no such treatment of chronic copper toxicity found in *Ayurvedic* original Text, but Enema therapy after bio purification and then symptomatic management may give complete relief.

KEYWORD: Copper, Copper toxicity, *Tamara*.

INTRODUCTION

Copper (Tamba) is not poisonous in its metallic state but some of its salts are poisonous, especially the most common salts of copper are the Sulphate or the blue vitriol (Nila Tutia) and the sub-acetate or Verdigris (Zangal). Copper Sulphate is a crystalline salt with blue colour and metallic taste in a small dose of 0.5 g it acts as an emetic but in large doses, as an irritant poison produces gastric and intestinal irritation. Copper sub-acetate is a blue green salt formed by the action of vegetable acids on copper cooking vessels which are not properly

tinned and which have been used for cooking and storage for a long time.^[1] Copper Toxicity is a condition that is increasingly common in this day and age, due to the widespread occurrence of copper in our food, copper fungicides, Copper IUD's, hot water pipes, along with the common nutritional deficiencies in Zinc, Manganese and other trace minerals that help keep levels of Copper in balance. *Ayurveda* is an ancient science and it mention various drugs (*Kalp*) and toxicity of copper in details, copper, it mimics with one sub type of cumulative (*Dushi visha*), as it accumulate on cellular level and exist for serval years. In *Ayurveda* bio purification by means of induces emesis, purgation and blood lettings are useful to remove the accumulated toxicants like copper.

AIMS AND OBJECTIVE

1. To discuss, evaluate and elaboration on Ayurvedic aspect of copper and its chronic toxicity in Human.
2. To establish the complete protocol of *Ayurvedic* management for chronic toxicity of copper.

METERIAL AND METHOD

This article is based on personal experiences & textual review. Material related to copper and its chronic toxicity in human was collected. All the *Brihatrayi*, *Laghutrayi* and available commentaries of those has reviewed. Modern Texts & various websites to collect information on the relevant topics were referred.

4. Conceptual Study

4.1: Ayurvedic Properties of Copper Table no 1.

S.no	Properties	Ras Trigni ^[2]	Ras Ratna Samuchya ^[3]	Rasendra Chudamani ^[4]	Ras Mitra ^[5]	Aanad Prakash ^[6]
1.	Tikta (Bitter)	✓	-	✓	-	-
2.	Kasaya	✓	-	✓	-	-
3.	Madhur(Sweet)	✓	-	✓	-	-
4.	Amala	✓	-	✓	-	-
5.	Katu	✓	-	-	-	-
6.	Usana	✓	-	-	-	-
7.	Lekhan	-	-	-	✓	✓
8.	Sigdha	✓	✓	-	✓	✓
9.	Tridoshanashak	✓	✓	-	-	✓
10.	Rasayan	-	✓	-	✓	✓
11.	VataKapha hara	-	-	✓	-	-
12.	Vishanashak	-	-	-	-	-
13.	Sita	-	-	-	-	-

14.	Sara					
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4.2 Source of Exposure^[8]

1. Congenital high copper (children born with high copper or low zinc)

Today, many children are born with excessive tissue copper. It is passed from high copper mothers to their children through the placenta. Stress from any cause contributes to copper imbalance. Stress depletes the adrenal glands and lowers the zinc level in the body.

2. Zinc deficiency

Whenever zinc becomes deficient, copper tends to accumulate. Our soil is low in zinc. Refined sugar, white rice and white flour have been stripped of their zinc. The trend toward vegetarianism reduces zinc in the diet, since red meat is the best dietary source of zinc.

3. High copper diets

Copper is found in many foods, particularly vegetarian proteins such as nuts, beans, seeds and grains. Meats contain copper, but it is balanced by zinc which competes for its absorption. Chocolate is high in copper. A desire for copper may help explain chocolate cravings. Copper pipes. Another source of copper is drinking water that remained in copper water pipes, or copper added to your water supply. During a recent dry summer, several Oregon cities added copper sulfate to their reservoirs to reduce algae growth. Accident and disease rates increased.

4. Mineral deficiencies

Deficiencies of manganese, iron, selenium, chromium and other minerals can contribute to copper accumulation.

5. Vitamin deficiencies

These include deficiencies in the diet of B vitamins and vitamin C.

6. Adrenal weakness

According to Dr. Eck's research, the adrenal hormones help stimulate the liver to produce ceruloplasmin, a major copper binding protein in the body.

7. Liver sluggishness or toxicity

A sluggish liver due to toxicity, slow metabolism or a chronic infection such as hepatitis C can predispose one to copper imbalance.

8. Other sources

They include using copper cookware, and copper exposure from dental materials, vitamin pills, and jewelry, drinking water, fungicide and pesticide residues on food, copper intrauterine devices and birth control pills. Plumbers and a few other occupations such as electricians may be exposed to copper. Hot tubs and pools may increase hair copper levels. Copper is used to sanitize pools and some hot tubs, and can increase hair copper, at times. Hot tubs and pools are also breeding grounds for so many microorganisms that are not killed by the chemicals that we don't recommend either for optimum health. It is much better to avoid all public pools and hot tubs and/or use about 250 parts per million of hydrogen peroxide to sanitize your hot tub. The internet has information about how to do this. When copper is out of balance, our bodies cannot control yeast overgrowth for these reasons. This often leads to chronic candida albicans infections that are resistant to treatment.

Ayurvedic sources^[9]

There are so many mercury compounds had have being used for prevention and cure of diseases since 11th century. The classical Ayurvedic preparation is broadly classified in 1.Ravitandav Ras 2.Hradaya arnav 3. Suryavart Ras 4.Shulabh kasseri Ras.

4.3 Copper compounds^[10]

1.Copper (II) acetate is used as a fungicide, catalyst for organic reactions, pigment for ceramics, insecticides, mildew preventive, preservative for cellulose materials, stabilizer for polyurethanes and nylons, corrosion inhibitor, and fuel additive.

2.Copper (II) chloride is used as a catalyst for organic and inorganic reactions, mordant for dyeing and printing textiles, pigment for glass and ceramics, wood preservative, disinfectant, insecticide, fungicide, and herbicide, and as a catalyst in the production of chlorine from hydrogen chloride. It is also used in the petroleum industry as a purifying agent, in the manufacture of indelible, invisible, and laundry marking inks, in metallurgy to recover mercury from ores, in refining copper, silver and gold, in tinting baths for iron and tin, in photography, in pyrotechnics, and to remove lead compounds from petrol and oils.

3. Copper (I) cyanide is used in silver, brass, and copper-tin alloy plating, and as an insecticide, fungicide, and anti-fouling agent.

4. Copper (II) hydroxide is used in the manufacture of rayon, battery electrodes, and other copper salts. It is used as a mordant in dyeing, as a pigment, food additive, and as a fungicide against bacterial soft spot on lettuce, peaches, cranberries, and walnuts. It is also used in herbicides, insecticides, treating and staining paper, antifouling marine paints, corrosion inhibitors, electroplating processes, electronics, fabric and textiles, flame proofing, fuel additives, glass, ceramics, cement, metallurgy, paper products, pollution control catalysts, printing and photo copying, pyrotechnics, and wood preservatives.

5. Copper (I) oxide is used as a pigment in glass, ceramics, enamels, porcelain glazes, and artificial gems, and as an optical glass polishing agent, fungicide, insecticide, molluscicide, welding flux for bronze, heat-collecting surface in solar energy devices, insecticide for potato plants, catalyst in ammonia manufacture, solvent for chromic iron ores, and component of antifouling paint for ship bottoms. It is used in manufacturing rayon, reducing tar in tobacco smoke, purification of hydrogen, 'sweetening' petroleum gases, and oxidation of exhaust gases from internal combustion engines. It is used in galvanic electrodes, pyrotechnics, cloud seeding, corrosion inhibitors, electroplating processes, electronics, fabric and textiles, flame proofing, fuel additives, glass, ceramics, cement, metallurgy, paper products, pollution control catalysts, printing and photocopying, and wood preservatives.

6. Copper (II) sulfate is used in preserving hides, tanning leather, manufacturing copper salts, preserving pulp wood and ground pulp, preventing and controlling Dutch elm disease, and controlling algae growth in impounded waters. It is used in electroplating solutions, laundry and metal marking inks, petroleum refining, pyrotechnics, water-resistant adhesives for wood, metal coloring, tinting baths, synthetic rubber, insecticides, herbicides, anti-fouling paints, corrosion inhibitors, electrolysis and electroplating processes, fabric and textiles, flame proofing, fuel additives, glass, ceramics, cement, food and drugs, metallurgy, nylon, paper products, and pigment and dyes.

7. Copper (II) oxide is used in the ceramic industry for imparting blue, green or red tints in glasses, glazes and enamels. It is occasionally employed for incorporation in mineral supplements for insuring against an insufficiency of copper in the diet of animals. Among its other uses is the preparation of solutions for the rayon industry.

4.4 Diagnosis of copper Imbalance

Blood Tests

Copper and ceruloplasmin levels can be measured in serum to detect copper poisoning. There will be some daily fluctuations as with all blood tests, but this is a useful measure. Unfortunately, few physicians run these tests routinely.

Hair Analysis

Hair analysis is a rapid, simple screening test that can reveal both direct and hidden copper imbalance. A copper level exceeding 2.50 mg% is considered elevated. However, there are several readings that indicate hidden copper toxicity. In other words, copper may not show up high on the hair test, but may be stored in various organs and will show up later as it is mobilized.

4.5 Chronic Toxicity of Copper as per Modern^[12]

Chronic Poisoning (Inhalation)

Metallic Fume Fever due to chronic occupational exposure of Copper Fume.

Clinical Manifestations of Chronic Poisoning (Ingestion)

1	Vineyard Sprayer's Lung Disease (VSLD)- due to chronic inhalation of copper Sulphate Spray used as Insecticide
2	Green Hair Discoloration due to chronic contact with swimming pool water containing Algicidal Copper Chemical
3	Wilson's Disease- it is inborn error of metabolism characterized by excessive accumulation of copper in Liver, Brain, Kidney & Cornea

4.6 Chronic Toxicity of Copper as per *Ayurveda*.

S.r.no	Symptoms	<i>Rasendra Sar Sangrah</i> ^[13]	<i>Ras Mitra</i> ^[14]
1.	<i>Murcha</i> (Syncope)	✓	<i>Murcha</i> (Syncope)
2.	<i>Vidaha</i>	✓	<i>Braham</i>
3.	<i>Sweda</i> (Sweeting)	✓	<i>Sweda</i> (Sweeting)
4.	<i>Keladan</i>	✓	<i>Keladan</i>
5.	<i>Vanti</i> (Vomiting)	✓	<i>Vanti</i> (Vomiting)
6.	<i>Aaruchi</i>	✓	<i>Aaruchi</i>
7.	<i>Chit Santap</i>	✓	-
8.	<i>Braham</i>	✓	-
9.	<i>Vidaha</i>	-	✓

5. Management of Copper Toxicity W.S.R to *Dushee Visha*

If there is long term hazards like *vaman* and *Vidaha* due to ingestion of impured Tamra in patient will found than decoction of coriander with milk and rice should be given.^[15]

Sanshodhan

A) *Vaman*^[16]

Pradhankarma- *Vaman*(Induced emesis)- After proper physical examinations patient is ask to complete shauch vidhi before the procedure of *vaman* will started in the early in morning. Then *vamnopag dravya* (assistant drugs for vomiting) will be given in the dose of 2-3 liters than *Dhamargav(Luffa cylendrica)* Mushti praman 10gram will be liked for inducing emesis. *Vaman veg* will be noted and counted and recorded. Emetic material will be collected in transparent glass water measure and observes for any abnormality effect. The adverse effect or any complications will be noted and managed.

Sansarjan Kram-The *sansargen kram* will be followed as per indicated in *panchkarma* (*kashinath shastri 2011*). Patient should be given liquid light diet (*peya*) in in frst day evening, second day morning and evening followed by semisolid liquid diet. Third day (*vilepi*) and \$th day morning. Then *Mung dal water* (Soup) up to seventh day.

Verechan(Induced purgation)^[17]- After proper examination of the patient the procedure of *virechan* started early in the morning. *Snuhi (Euphorbia nerifolia)* in 4gram will be given mixed with *trivrit kwath* 100ml. The *virechan vegas* will be countered and recorded (*kashinath shastri 2011*).

Sansarjan Kram- The *sansargen kram* will be followed as per indicated in *vaman karm* (*kashinath shastri 2011*).

Basti^[18]

Yog basti having *vat nashak anuvasan basti* and *pakwashaya shodhak niruh basti* should be used to pacify to *prakopak vat* due to chronic Copper toxicity. it should be given alternate in manner means first *anuvasan* than *niruha* (1:3:3:1) *vat nasak anuvasn basti* contening *Bael, Artni, sonapatha, Gambhari, and Patala* should be given in 120ml in quantity after meal. *Pakwashya shodhak basti* contening *kwath* of *madan phal, Devdali, tillaouki ke beej, Dhamargav, Indrayav* these drugs prepared with cow's urine should be given 400ml empty stomach.

Ayurvedic anti-dote-*Sofa* (*Foeniculum vulgare*), *sita*, and milk.^[19]

6. CONCLUSION

Chronic toxicity of Copper is significant problem due to occupational and environmental exposure as well as consumption of drinking water. There is no such treatment of chronic Copper toxicity found in original text, but enema (Basti) therapy after bio purification and then symptomatic management give complete relief.

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