A Review on: Physicochemical evaluation of ayurvedic mineral drug Tankan Bhasma

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ABSTRACT

Tankan bhasma which has been used since very long time in Ayurveda. Tankan bhasma purification is done by the mand agni. Evaluation of physic-chemical property of Tankan bhasma. We are studying toxicological study of Tankan (Borax). Toxicological study on eyes, skin, inhalation, ingesion, carcinogenicity, reproductive or developmental, target organs, also signs and symptoms of exposure. We are studied on the first aid treatment if hazards due to contacts with eyes, Ingestion, and skin. Various uses of Tankan (Borax) bhasma we are studying. Also we are studying the analytical evaluations. Such as Tankan (Borax) bhasma evaluation containing moisture content, organic contain, Nishchandratva, Nishchandratva, Varitaratvam, Rekhapurnatvam, Unama test, Nirchandrata, Amla pariksha, Avami, Anjana Sannibha, X-ray diffraction i.e XRD study, also the Scanning Electron Microscope that is SEM, this all methods we are using for the evaluation of Tankan (Borax) bhasm.

Keywords: Tankan bhasm, borax, ayurvedic mineral

INTRODUCTION

The therapeutic efficacies of many indigenous plants for various diseases have been described by traditional herbal medicine practitioners. Natural products are a source of synthetic and traditional herbal medicine.[1] Tankan is characterized by swelling in throat region also pricking pain and burning sensation.[2] Tankan is known in various regions having synonym in Sanskrit- Tankan, Hindi- Sohaga, English- Borax, Panjabi- Tinkal, Telgu- Velligarm.

Tanaka (Na2B4O7 10H2O) is composed of boric acid and soda. Chemical name of borax is Sodium Tetraborate Decahydrate. Borax is a chemical element with atomic number 5 and symbol B in periodic table and essential for life. Borax is common bazar drug available in various regions and occurs in an impure condition. Borax is an essential element for dietary intake for human and animals and it should be consumed daily with foods and beverages. Furthermore, fruits and vegetables are the primary sources of borax, plants have higher borax levels (0.1 to 0.6 mg borax/ 100 g) than foods of animal origin (0.01 to 0.06 mg/100 g). In vegetables, boron is especially found at the highest levels in leafy greens.[3][4]

It exists as crystalline tough masses or in the form of translucent irregular masses, and when exposed to air it becomes opaque. Tanaka (Borax) is a salt of tetra Boric acid, an important compound of Boron, which is also known as sodium biborate. In the Rasa shastra, Tanaka has its own important role because of its high therapeutic value[5]. It is heated to remove moisture, and then further heated to get white dry powder. It is pungent in taste, hot in nature[6]. Borax contains 11.34% boron. Boron is always chemically bound to oxygen forming borates (e.g., borax or boric acid). Boron is a naturally occurring element widespread in nature. The average concentration in the earth's crust has been estimated to be 10 ppm and in seawater, 4.6 ppm.[7]

MATERIALS AND METHODS

Purification of Tankan: There are few methods for purification, it can be purified by Raw Tankanis first powdered, then it take in hot iron pot & stirred till it intumesced this Tankan then make powder very fine and used for analysis.[6] Also it can be purified by

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dissolving it in water, straining through cloth and evaporating to dryness. [3]

Another method for purification is Raw Tanaka is take in a clean and dry Khalva yantra and pounde well to prepare powder. This powder is take in to a Sharava (earthen pot) then it is heated in Mandagni (Mild heat), followed by Tivragni (maximum heat), until all the water content in the Tanaka is completely evaporated. Finally Tankan is obtained as a white coloured puffy light substance. After three time purification almost 50% of weight is reduced, because of the evaporation of water in the raw Tanaka.[5]

Figure:1 Purification of Tankan (Borax)

Physico-chemical properties.

Appearance: White, odorless, crystalline solid.

Solubility in water: 4.71% at 20°C; 65.64% at 100°C.

Molecular weight: 381.37.

TOXICOLOGICAL EFFECTS

On Eyes: when applied to the eyes of albino rabbits (Draize test), produced effects of mild erythema, and mild to moderate discharge in 5 of 6 rabbits. All signs subsided by the fourth day after application. But Borax is non-irritating to eyes in normal industrial use.

On skin: Boric Acid was applied to the skin of albino rabbits. Slight to no irritation persisted 72 hours after application. No evidence of tissue damage was found. Low acute dermal toxicity; LD50 for rabbits is expected to be greater than 2,000 mg/kg of body weight. Sodium tetraborate decahydrate is not absorbed through intact skin.

Inhalation: Human epidemiological studies show no increase in pulmonary disease in occupational populations with chronic exposure to Boric Acid and Sodium Borate dust.

Ingestion: Products containing Borax are not intended for ingestion. Low acute oral toxicity; LD50 for Sprague-Dawley rats is 4,500 to 5,000 mg/kg of body weight. Also small amounts (e.g., a teaspoonful) swallowed accidentally are not likely to cause effects; swallowing amounts larger than that may cause gastrointestinal symptoms.

Carcinogenicity: Sodium Tetraborate Decahydrate is not listed as a carcinogen by the Environmental Protection Agency (EPA), the State of California, or the International Agency for Research on Cancer (IARC). A report issued by the National Toxicology Program showed "no evidence of carcinogenicity" from a full two-year bioassay on Boric Acid on mice at feed doses of 2,500 to 5,000 ppm in the diet. No mutagenic activity was observed for boric acid in a recent battery of four short-term mutagenicity assays.

Reproductive/developmental: Animal ingestion studies in several species, at high doses, indicate that borates cause reproductive and developmental effects reduces or inhibits sperm production, causes testicular atrophy and when given to pregnant animals during gestation, may cause developmental changes A human study of occupational exposure to borate dust showed no adverse effect on reproduction.

Target organs: No target organ has been identified in humans. High dose animal ingestion studies indicate the testes are the target organs in male animals.

Signs and symptoms of exposure: Symptoms of accidental over-exposure to Borax might include nausea, vomiting and diarrhea, with delayed effects of skin redness and peeling. These symptoms have been associated with the accidental over-exposure to the chemically related substance.

FIRST AID TREATMENT IF HAZARDAS

Eye contact: Use eye wash fountain or fresh water to cleanse eye. If irritation persists for more than 30 minutes, then as early as possible patients should give medical attention.

Skin contact: No treatment necessary because non-irritating.

Ingestion: Swallowing small quantities (one teaspoon) will cause no harm to healthy adults. If larger amounts are swallowed, give two glasses of water to drink and seek medical attention.[8][9][10]

TANKAN BHASMA (BORAX) USES

It is used in Ayurvedic treatment-

In that lack of menstruation, cough, bronchitis etc. It is also used as ingredient in many Ayurvedic medicines specially those kalpas which contains Vatsanabh as its chief ingredient.

Useful in Vata imbalance diseases

As antidote-

Tankan is might be to minimize toxic effects of Vatsanabh. This concept highlights the antidote property of Tankan in Vatsanabh toxicity.[6]

Wound healing -

Tankan is used in the process of repair that follows injury to the skin and other soft tissues. The objective in wound management is to heal the wound in the shortest time possible, with minimal pain, discomfort, and scarring to the patient.[1]

Another Uses-

-It is used in the treatment of cough, bronchitis.

-It is also used in treating food poisoning.

-It improves digestion power, relieves bloating.

-It induces menstruation in women suffering with amenorrhea or oligomenorrhea (Scanty menstrual flow).

-It is useful in dandruff Tankan is applied on hair and keeps for 5 to 10 min and washes out.

-It is useful ulceration of mouth and cracks and fissures of tongue.

-Dose varying from 10-30 grains are given in prolonged labour.

-Useful in other uterine infection.

-Useful in chronic tonsillitis.

The gargling with Tankan bhasma dissolved water gives significant result in relieving the tonsillitis[14].

ANALYTICAL EVALUATION OF AN AYURVEDIC FORMULATION - TANKAN (BORAX) BHASMA

Moisture content: Bhasma sample and formulation weight and place in the oven at 110°C for 3 hrs. They were weighed again and the difference is determined to find the moisture content.

Organic Content: Bhasma sample and formulation weight and place in the muffle furnace at450°C for 3 days until constant weight obtained. The difference is determined to find the organic content[13].

Nishchandratva: The chandrika (luster) present in the metal is due to its physical property, which reflects the light when fall on it. The absence of chandrika in the bhasma indicates that every particle of the mineral has been incinerated and converted in to bhasma form. Tankan bhasma take in a petri dish and visually examined for any luster in bright sunlight through magnifying glass. No luster observe in the Bhasma i.e. it's incineration is complete.

Varitaratvam: A little amount of bhasma sprinkle on stagnant water surface and observe, whether the bhasma floats water surface or not. Varitara test, applied to study lightness and fineness of bhasma, is floating character of bhasma on stagnant water surface. This test is based on the law of surface tension. A small amount of the procured bhasma sprinkle over the still water in a beaker. It found the bhasma particles floated over the surface of the water that is bhasma varitaratva (floats on water). This indicates that particle size of the bhasma does not break the surface tension of the water and also uniformity of the particles.

Rekhapurnatvam: It is an organoleptic method conducted by the fingertips to study sukshmata (fineness) of any Bhasma. Bhasma particles should be of minimum size for penetration of the bhasma particles up to minute capillaries of the body without any obstruction, best absorption and assimilation in the body. The rate of absorption of drug is directly proportional to the particle size of drug. Finer the particle size, quicker is the absorption. A pinch of bhasma is taken in between the thumb and index finger and rubbed. The bhasma fill the lines and crevices of the finger easily, and this will not wash out from the cleavage of the lines i.e., the bhasma is rekhapurnatva (fine). It is a common parameter to be applied for any product/formulation, which contains drugs of mineral/metal origin.

Unama test: It is a further assessment of Varitara test. A grain of rice is kept carefully on the layer of floated bhasma. The grain will remain as it is on the layer indicative of its excellent preparation.

Nirchandrata: Bhasma take on palm and observed in the sunlight.

Nisvadutam/Gatarasatwa: The prepared bhasma should be tasteless. This can be check by small amount of bhasma kept on the tongue.

Nischandrata:
Bhasma take on palm and observed in the sunlight i.e number of lustered particle is observe in sunlight.

Amla pariksha: A pinch of prepared bhasma mixed with a little amount of dahi (curd) in a clean and dry petri dish and observe for any color change. No color change of dahi is observed. The same procedure is follow with lemon juice take in a clean and dry test tube, and the same result is observed. This test confirms that the sample is not an intermediate.

Avami: Ingestion of 5-10 mg of the bhasma and observe there is observe any nausea or vomiting.

Anjana Sannibha: Anjana (coryllium) is smooth in character and it does not create any irritation whenever applied. Tankan bhasma is found to be smooth without creating any irritation to mucous membrane.[11][12]

X-ray diffraction: XRD is a versatile, nondestructive technique that reveals detailed information about the chemical composition and crystallographic structure of natural and manufactured materials. X-Ray Diffraction study is a powerful procedure for detecting the presence of various phases in a given sample. The basic principle of the phase analysis using powder XRD technique lies in the presence of diffraction peaks corresponding to various inter planar (dhkl) spacings which are the characteristics of a given material. The relative intensities of various peaks occurring at different 'd' spacings are also different for different phases.

Scanning Electron Microscope: During SEM inspection, a beam of electrons is focused on a spot volume of the specimen, resulting in the transfer of energy to the spot. These bombarding electrons, also referred to as primary electrons, dislodge electrons from the specimen itself. The dislodged electrons, also known as secondary electrons, are attached and collected by a positively biased grid or detector, and then translated into a signal. To produce the SEM image, the electron beam is swept across the area being inspected, producing many such signals. These signals are then amplified, analysed, and translated into images of the topography being inspected. Finally, the image is shown on a CRT.[5]

CONCLUSION

In this review article Tankan bhasma which is prepared from the Borax we studied physico-chemical evaluations. Also other studies like toxicological study on various sites and organs of the human beings and first aid treatment on the same. Also in this review article we studied on various evaluations parameters of Tankan bhasma. In that analytical study which include X-ray diffraction i.e XRD study, and the Scanning Electron Microscope that is SEM and other evaluation studies.

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