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REVIEW ARTICLE

BAMBUSHA: REALM OF INDIAN TRADITIONAL MEDICINE

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Abstract

Over the past decades in Indian antiquity, Vanshlochan (Bambusha) is considered as a tonic in treating various ailments. Initial development of such ingredient, predominantly silicon compound, with trace amount of certain elements. A methodological strategy offers to characterize novel candidate bambusha drugs from various bamboo species plants in favor of modern instrumental technique like physico-chemical, X-ray diffraction, fourier transform infra-red spectroscopy, scanning electron microscopy, inductive coupled plasma atomic emission spectroscopy. Bambusha is recommended as a bioavailability enhancer and provide synergistic effect like various well-known medicaments - Sitopaladi, Talisadi, Dadimashtaka, Vilwadichurna and Prabhakar, brambhivati in Ayurveda along with other Unani formulation. The safety and efficacy of this mad stone is not explored scientifically. This review mainly focuses on the traditional, experimental, physico-chemical information of Bamboo manna.

Keywords: Ayurvedic, Bambusha, Silicon, Synergistic, Bioavailability.

1. Introduction

Bambusha also known as Bamboo-manna, Tabasheer, Vanshlochan and Eye of the bamboo is the siliceous materials generally found in the culms of the some species of bamboo. It is one of the drug of choice for treating bronchitis, asthma, emmenagogic, febrifugal, demulcent, poisoning cases, paralytic complaints, cardio-tonic, aphrodisiac, small pox and measles, peccatorial properties and haemostatic etc [1,2]. It is also used as one of the valuable ingredient in various Ayurvedic formulation like Sitopaladi, Talisadi, Dadimashtaka, Vilwadichurna, Chawnprash [3]; Unani formulation like *Qurs-e-Tabaasheer*, *KafooriLului* (hectic fever), *Qurs-e-TabaasheerMulaiyinin*, *Qurs-e-TabaasheerQabiz*, *Safoof-e-Tabaasheer* and *Jawarish-e-tabaasheer* [4].

Vanshlochans comprehended in both natural and synthetic way and sold without any solid official authentication system in Indian Market. For the first time Mr. Macie's preliminary studies established the physico-chemical data of various specimens of tabasheer by series of experiment with water, vegetable colors, with acids, with liquid alkali, dry alkalies and other fluxes [5]. Klinowski J et al, also in augurated its analysis with modern analytical technique viz: X-ray diffraction (phase crystallinity), thermogravimetric analysis (TGA), solid state NMR, and X-ray fluorescence (elemental composition)[6]. Recently studies were

carried out on naturally available samples of vanslochan from Odhisa (India) for its microscopical, physico-chemical and heavy-metal analysis according to Indian Ayurvedic Pharmacopoeia [7]. In contemporary times tabasheer is deliberately adulterated with burned bones, synthetic silica, and arrow root (substitute) in various formulation due to its improper procurement and unavailability. Generally Vanshlochana is formed only after twelve years of flowering period in hollow internodes of Bamboo [8]

Indian traditional medicine faces challenges in terms of regulatory approvals, safety and efficacy, standardization, and quality control. So there is a need of evidence based scientific studies for evaluation of the therapeutic efficacy and safety of Tabasheer. Present review article explains the pharmacological, analytical and clinical importance of the vanshlochan in Indian Ayurveda. Bambusha is an antique component in Indian traditional medicine; it is time to re-evaluate the various clinically well-documented indications inform of reverse-pharmacology, molecular biology, proteomics, metabolomics, and networking pharmacology.

2. Chronological history of Bambusha

Bamboo manna originates from Sanskrit word – Tvak – kshira (Bark milk). In regional language of Indian subcontinent it is known as Sansk. - Vanshalochan, Venulavana, English-Bamboo manna,

Hindi-Banskarpur, Bengali-Bans-karpur, Bans, Marathi-Bansmitha, Telegu-Mullu Vedru, Unani-Tabasheer[9]. From the ancient time tabasheer (bambusha) has gained interest as actual drug in eastern countries like India, China etc. China claimed it as “fossil teeth of china” and the belenities (“thunder bolts”) due to its mode of occurrence. According to David Brewster claim, tabasheer is produced in particular those joint of bamboo which are in injured, unhealthy or inmalformed condition. It is also found in form of siliceous fluid (bambusha) in those types of joints of stem where membrane lining cavities are destroyed or rent by disease [10]. The various studies related to tabasheer clarified concisely to reveal its controversy and original habitat [Table-1]. Alternatively the acquaintance about the tabasheer is basically familiarized in Western Europe by the Arabian Physician, but Patrick Russell (Vizagpattanam)

criticized as a royalty of tabasheer as an Arabian[11]. Sir Joseph Banks was magnificently growing bamboo in a hot house at Islington – collected special tabasheer by method of splitting. Prof Andes collected tabasheer as American specimen, but their result is different from other specimens in composition[12]. Dr. Russell successfully collected liquid and solid form of tabasheer from different joints of bamboo. His results gave details about the character of the tabasheer i.e it is clear, transparent, colorless or greenish tint or white in colour, sometimes it is thicker and of a white colour and other times darker and having honey like consistency [13]. Prof. Edward Turner categories tabasheer as three types: chalky, translucent, and transparent also claimed Indian tabasheer consist entirely pure silica with minute quantity of lime and vegetable matter. D.W. Rostvan Tonningen studied Java specimen named tabasheer.

Table: 1.The chronological findings of the various author in context Vamshalochan (Tabasheer)

Author	Argument	Positive findings	References
Mr. Thiselton dyer (Attention name as Tabasheer)	Concentrate the interesting substance the respective community (Physicists, Botanist and mineralogist)	To categorize as vegetable kingdom and Mineral kingdom	[13]
Dr. David Brewster (Physicist) First Indian specimens which gave Dr. Kennedy	Curious product in vegetable kingdom (Tabasheer), Making thin section for examining under microscope.	The phosphorescent , opalescence property with white, opaque, thoroughly saturated with water, perfectly transparent and measure refractive index.[Colloid silica itself]	[13]

Sir Joseph Banks	Growing bamboo in a hot house at Islington – Collect special tabasheer in the method of splitting	A small pebble about the size of half a pea, externally dark brown or black colour with reddish – brown tint. So hard as to cut glass, crystalline structure in parts, Contain silica and iron	[13]
Prof Andes	South American (Pichincha) specimen gave MM. Fourcroy and Vauquelin.	A milk white colour, apparently crystalline, semitransparent and gelatinous. Ignition it became black, and emitted pungent fumes. 70% silica, 30% of potash, lime, water and organic matter.	[13]
Prof. Edward Turner	Indian tabasheer to consist almost entirely pure silica with minute quantity of lime and vegetable matter.	Tabasheer are categorized - chalky, translucent and transparent tabasheer. Specific gravity, Loss at 100°C, red heat measured.	[13]
Guibourt	A theory of the mode of formation of tabasheer – Certain periods of its growth the bamboo needed less silica than at other times, and that when not needed, the silica was carried inwards and deposited in the interior.	Silica-96.94%, Potash and lime-0.13%, Water-2.93%, Organic matter-trace. Study different part of the bamboo- Ashes of the wood - 0.0612%.	[13]
D. W. Rost van Tonningen	Specimen tabasheer from Java named as “singkara” (island) It resembles like Indian Tabasheer.	Silica- 86.387, Iron oxide-0.424, Lime-0.244, Potash-4.806, Organic matter-0.507, water - 7.632 (%)	[13]

Rationality behind the Bambusha study:

The bamboo-manna is not a sugar, but a white, gritty body and salt like brittle between the teeth (Fig-1). According to Watts’s (Dictionary of Chemistry) Bambusha is defined as “Hydrated silica, occurring in stony concretions from the

joints of bamboo, it resembles hydrophane, and when thrown upon water does not sink till completely saturated[14]. For collecting the natural vanshlochan listening to the rattling sound of the bamboo is one of the acceptance criteria for presence and absence of tabasheer[15]. Small quantity of tabasheer is generally available in the

bottom and sides of the cavity of bamboo of the certain species like (*Bambusa arundinacea* and *Melocana bambusoides* etc.) Bambusha has greater abundance than others. Production of the tabasheer is greatly influenced by the soil, situation and season. The principal component of tabasheer i.e silica (amorphous, crystalline and colloidal form) is deliberately adulterated. On the contrary, requirement of dietary silicon and its mechanism of action is yet not clearly elucidated.

Biogenic silica attributed with metal ions is an important part of biology. However there is still no evidence to support the idea of mechanism, silicon manifestation. The toxicity profile data is not available in approval of bamboo-manna. The ingredient (Tabasheer) containing various formulations hypothetically act as synergistically, antagonistically and supra-additively, bioavailability enhancer, nano carrier.



Fig no -1, Marketed tabasheer (Bambusha) specimen

Experimental research of Bambusha in various environments

Bambush awas analysed in terms of physico-chemical, instrumental, pharmaceutical and standardization purpose which explained in table-2.

Account of fame chemical experiments on tabasheer (Bambusha) :

According to James Louis Macieand Co, seven sample were collected (Tabasheer), hydrated silica found within stems of some

species of bamboo are used in medicine. From Various respective areas, sample are procured for studying tabasheer (Bambusha) which frequently treated with water, vegetable colours, fire, acids, liquid alkali, dry alkali, and other fluxes.

Table: 2. Research envisaged in context Bamsalochan

Research envisaged	Parameter performed	Positive findings	References
An account of fame chemical experiments on Tabasheer	Treated with water, vegetable colours, acids, liquid alkalies, dry alkalies and other fluxes.	Physico-chemical constant (like ash value, LOD, etc)	[5]
Structural studies of Tabasheer, an opal of plant origin	X-ray diffraction, and Fluorescence, Thermogravimetric analysis, Solid state NMR	22 ⁰ θ humpy peak, elemental composition,	[6]
Method of identification and standardization of Vamsalochan (Bamboo-manna)	Physico-chemical, Microscopic examination, Heavy metal analysis	Rosette crystal, silica- 85.78%, Heavy metal is absent	[7]
Standardization of talisadichoorna and guti containing synthetic vanshlochan	X-ray diffraction, surface electron microscopy, Energy dispersive analysis, Thermo gravimetric analysis	Blurred peak at 20 degree, amorphous, crystalline, sodium, potassium, P, calcium, Fe and weight loss at 610 degree.	[8]

XRD, Thermo gravimetric analysis, XRF, Solid state NMR

Jacek Klinowski et al, appropriately utilized the modern analytical technique to proceed tabasheer physico-chemical fingerprinting profile. XRD pattern showed prominent broad peak in the region at about $22^{\circ}2\theta$ with amorphous nature. Thermogravimetric profile revealed gradual hydroxylation at 250°C due to presence of bound water which established the "OH" presence.

X-ray fluorescence (XRF) showed that silicon is the major element along with other trace amount of oxide form such as aluminium, calcium, magnesium, phosphorus. The solid state NMR established the presence of 4-coordinate (Tetrahedral) aluminium in part of silicate network. ^1H NMR spectra successfully described two types of hydroxyl group and also explained proton-proton distance during dehydroxylation as a function of temperature. Intracellular biological silica generally completely aluminium free because of extracellular silica in bamboo is tendency to exclude aluminium from the plant cell.

Method of identification and standardization of Vanshlochan

Recently another study has been to standardize Vamsalochana with help of various physicochemical parameters like alcohol soluble extractive, water soluble extractive, total ash, acid insoluble ash were determined according to ayurvedic

Pharmacopoeia of India (API). Microscopic examination revealed the presence of rosette crystals of calcium oxalate. Characteristic colours were obtained when the powder drug treated with different chemical reagents and solvents. Heavy metal analysis indicates the presence of silica as major component (85.78 %). Toxic metals like arsenic, cadmium, mercury and lead were absent.[7]

Future need in favor about bambu-manna study:

The challenges are under regulatory status, the bambusha is lacking in assessment of the safety and efficacy in favor of national and international drug regulatory authorities. The silica is predominant in bambusha and is substantially used as substitute and adulterant substance but there is no clear valid document to fulfill the use of it. Although various traditional Ayurvedic formulation casts off one of the important ingredient in Ayurvedic Pharmacopoeia with-out any official valid proper documentation.

Conclusion:

A literature review has highlighted that Bambusha (Vamsalochan) exhibits important traditional clinical claim in context of expectorant, immunomodulator, various ailments. It also covered various physico-chemical, solid state analytical instrument the way of biogenic silica predominant along with trace element. Bambusha needs more authentic and

validated safety document to be used as medicine in traditional medicine. Also revalidated the efficacy claim in traditional claim with reverse-pharmacology, interdisciplinary way.

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