Bhutanese *Brag-zun* (mineral pitch): Its uses and scientific findings

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**Abstract**

*Brag-zun* is the most sought after medicinal product in Bhutan and also in the Asian countries. It is used in many folkloric and traditional medicines for treating various disorders and is commonly known as the "destroyer of all illnesses". According to *gso-ba-rig-pa*, *Brag-zun* is used for treating fever, ulceration of stomach, liver and kidney diseases, dysentery, gout, rheumatism, boosting the body immune system (as rejuvenators) and for improving the eyesight. In Bhutan, *Brag-zun* is collected from the rocky cliffs in Chukha, Punakha and Paro Dzongkhags and is used for formulating as many as seventeen different traditional medicines. The scientific literature review found that *Brag-zun* has been extensively studied and the findings substantiate most of its ethnomedical claims. However, no study was done on the Bhutanese variety of *Brag-zun*. Therefore, series of studies were carried by the authors mainly to assess its anti-oxidant and anti-microbial activities. These studies found that the Bhutanese variety of *Brag-zun* exhibited the anti-oxidant and the antifungal activities. It was active against *Candida albicans* and *Microporeum gypsum*. Thus, this paper describes the reported scientific findings of *Brag-zun* and the findings of the Bhutanese variety of *Brag-zun*.

**Keywords:** *Brag-zun*; Ethno-medical uses; Scientific findings; Anti-fungal; Anti-oxidant.

1. Introduction

*Brag-zun* (Fig.1) is a herbo-mineral drug ejected out of fissures in iron rich rocks, during hot weather. *Brag-zun* is called Silajatu in Sanskrit and Mineral Pitch or Asphaltum/Bitumen in English. Indian calls it Silajita and Pakistanis call it Salajit. In ancient Hindu literature, there are different types of Silajit. They are Iron silajit (blackish-brown variety), Copper silajit (blue variety), Silver silajit (white variety) and Gold silajit (red variety). *Brag-zun* is bitter and pungent in taste and hot in potency. The true Shilajit smells like cow’s urine.

*Brag-zun* is commonly found adjacent to conifer forests especially in the Himalayas, Vindhya and other mountains in India, Nepal, Bhutan, Pakistan and Afghanistan (Zahler, 1998). Inside Bhutan, it is found in the rocky cliffs in Chukha, Punakha and Paro Dzongkhags.

The *Brag-zun* was first discovered by Himalayan villagers observing large white monkeys migrate to the mountains in the warm summer months. The monkeys were seen chewing a semi-

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*Fig.1: Raw Brag-zun*
soft substance that flowed from between layers of rock. The villagers attributed the monkey’s great strength, longevity and wisdom to this substance. These villagers consumed and reported a broad spectrum of improvements in their health. It seemed to give them more energy, relieve digestive problems, increase sex drive, improve memory and cognition, improve diabetes, reduce allergies, improve the overall health and it seemed to cure all diseases (Hartman, 2002).

Since then, the *Brag-zun* became popular and today it is widely used in many folkloric and traditional medicines. In Ayurvedic and Unani medicines, *Brag-zun* is used as an aphrodisiac, antiseptic, anodyne, parasiticide, internally alterative, tonic, slightly laxative, disinfectant, expectorant, diuretic, respiratory, stimulant and intestinal antiseptic (Ahmad & Arunachalam, n.a). It is an important ingredient in the Ayurvedic preparations for strengthening immune system of human body (Kokate & Gokhale, 1995).

According to *gso-ba-rig-pa*, the processed *Brag-zun* (Fig.2) is individually used for treating fever, ulceration of stomach, liver and kidney diseases, dysentery, gout, rheumatism, general tonic stimulant for strengthening the body immune system (as rejuvenators) and for strengthening as well as improving the eyesight (Dash, 1987).

*Fig.2: Processed Brag-zun*

*Brag-zun* is collected in a raw form by the farmers and they sell it to the Pharmaceutical and Research Unit (PRU) at a cost of Nu.395/kg (2009 quoted price). The PRU procured 1000 Kilograms of *Brag-zun* in 2007 (Procurement Record, 2007). The pre-processing of this crude *Brag-zun* is done at PRU. It is dissolved in water and left standing till the soil and other foreign matter settles down. It is decanted and then boiled at 90-100 degree Celsius. It is then concentrated to get the slurry form of processed *Brag-zun* which is then used for making 17 different types of Bhutanese traditional medicines (Tenzin, 2007) in combination with other ingredients as mentioned below.

1. gser-m.dog-5-pa used for treating indigestion and jaundice
2. gser-m.dog-11 used for treating gallstone
3. churu -25 used for treating blood pressure and liver diseases
4. s.kren-’jom-zda-b.sil used for treating gallstone and as anticoagulant
5. klu-b.dud-18 used for treating leprosy, skin diseases and boil
6. gurgum-7-pa used for treating kidney diseases and fever
7. gumphye-d.mar-po used for treating dysentery and gout
8. goyu-28 used for treating gonorrhea and strengthening kidney functions
9. giwam-9-pa used for treating fever and for stopping nose bleeding
10. thangchen-25 used for suppressing high body temperature and for improving appetite
11. rdutsi-5-lum used for treating gout and paralysis
12. spois-d.kar-10-pa used for treating gout and rheumatism
13. brag-zun –9-pa used for treating stomach acidity (ulcer)
14. ’basam-lhalung used for treating kidney diseases
15. gya-kyi-25 used for treating jaundice
16. se-bru-kuen-b.dey used in treating gastritis and promoting digestion and
17. zda-zhel-rdutsi-ma used for treating liver diseases and gastritis

Brag-zun is the most sought after products in Bhutan and in the region. While extensive research
has been reported on this product, no specific study was done on the Bhutanese Brag-zun. Therefore, a study was conducted on the Bhutanese variety of Brag-zun to find its anti-oxidant
and anti-microbial activities. In the process, a scientific review was also carried out to find what
has been done and reported so far.

This paper thus describes the scientific findings of Brag-zun reported in the literatures and also
about the findings of the Bhutanese variety of Brag-zun in relation to its anti-oxidant and anti-
microbial activities.

2. Reported Scientific Findings

2.1 Chemistry of Brag-zun

According to the literatures related to Mineralogy, Brag-zun is reported to be an oxygenated
hydrocarbon of different types with their melting points ranging from 90-1000 degree Celsius. It
gives bright flame without fumes when burnt. It is soluble in turpentine. The reported chemical
contents of Brag-zun are; humic acid, fulvic acid (3-20%), Dibenzo-α-Pyrones (1%) and 4’-
Methoxy-6-Carbomethoxybiphenyl (Sahlelian, n.a). These chemical compositions and the pH of
Brag-zun differed based on their geographical origin (Table 1).

Table 1: Composition and pH of Brag-zun by geographical origin (Jamtsho, 2006).

<table>
<thead>
<tr>
<th>Country</th>
<th>pH of 1% aqueous solution</th>
<th>Relative% composition of low Mw extracts</th>
<th>Fulvic acid% composition</th>
<th>Relative% composition of humic acid constituents</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>6.2</td>
<td>17.9</td>
<td>21.4</td>
<td>19.8</td>
</tr>
<tr>
<td>Nepal</td>
<td>7.5</td>
<td>20.0</td>
<td>15.4</td>
<td>11.4</td>
</tr>
<tr>
<td>Pakistan</td>
<td>6.8</td>
<td>4.3</td>
<td>15.5</td>
<td>5.6</td>
</tr>
<tr>
<td>Russia,</td>
<td>8.2</td>
<td>29.7</td>
<td>19.0</td>
<td>11.5</td>
</tr>
<tr>
<td>Bhutan</td>
<td>7.4</td>
<td>pH test at Silpakorn University</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2.2 Pharmacology of Brag-zun

Over sixty years of clinical research have shown that Brag-zun has positive effects on human
health. It increases longevity, improves memory and cognitive ability, reduces allergies and
respiratory problems, reduces stress, and relieves digestive troubles. It is anti-inflammatory,
antioxidant, and eliminates free radicals. The research works reported in the literatures provides
evidences that \textit{Brag-zun} increases immunity, strength, and endurance, and lives up to its ancient reputation as the "destroyer of weakness" \cite{Hartman, n.a}. Extensive proof has been submitted on the healing, anti-aging and restorative properties of \textit{Brag-zun}.

The primary active ingredients in \textit{Brag-zun} are Fulvic Acids, Dibenzo-\(\alpha\)-Pyrones, Humins, Humic Acids and trace minerals. Fulvic Acids are small lattice shaped molecules that act as carriers for the Dibenzo-\(\alpha\)-Pyrones and trace minerals into the body. The trace minerals act as co-factors for enzymes, as catalyst for energy conversion, as electrolytes for maintaining the electrical balance in bodily fluids, as an oxygen carrier in the body, and as neuro-transmitters \cite{Hartman, 2002}. The Dibenzo-\(\alpha\)-Pyrones are able to pass the blood brain barrier and act as a powerful antioxidant protecting the brain and nerve tissue from free radical damage. It also inhibits the enzyme acetyl cholinesterase, which breaks down the acetylcholine. Low levels of acetylcholine are associated with Alzheimer disease, poor memory and poor concentration \cite{Hartman, 2002}.

Some of the claims are being substantiated by scientific papers published by various journals as mentioned below:

i) \textbf{Allergies}


ii) \textbf{Anti-inflammatory}


iii) \textbf{Antioxidant}


b) \textit{Interaction of Shilajit with Biogenic Free Radicals}. Shibnath Ghosal, Soumyn Lata, Yatendran Kumar, Department of Pharmaceutics, Banaras Hindu University, Varanasi-221005, India.


iv) \textbf{Diabetes}

\textit{Shilajit Attenuates Streptozotocin Induced Diabetes Mellitus and Decrease in Pancreatic Islet Superoxide Dismutase Activity in Rats}. Salil K. Bhattacharya, Neuropharmacology laboratory, Dept. of Pharmacology, Institute of medical sciences, Banaras Hindu University, Varanasi-221005, India.

v) \textbf{General}


**vi) Immunity**

a) *Shilajit Induced Morphometric and Functional Changes in Mouse Peritoneal Macrophages*. Shibnath Ghosal, Dept. of Pharmaceutics, Banaras Hindu University, Varanasi-221005, India.


**vii) Memory**

a) *Effects of Shilajit and Its Active Constituents on Learning and Memory in Rats*. S. Ghosal and J. Lal Pharmaceutical Chemistry Research Laboratory, Department of Pharmaceutics, Institute of Technology, Banaras Hindu University, Varanasi-221005, India.

b) *Effect of Shilajit on Rat Brain Monoamines*. S. K. Bhatineharyn; Dept. of Pharmacology, Institute of medical sciences, Banaras Hindu University, Varanasi-221005, India.

3. **Chemical, anti-oxidant and antifungal studies of Bhutanese Brag-zun**

The chemical, anti-oxidant and antifungal analysis of Bhutanese *Brag-zun* was carried at the Mahidol University and the Department of Medical Sciences in Thailand. The Bhutanese *Brag-zun* was assessed for the following:

3.1 **Chemical analysis**

The *Brag-zun* was analysed for the alkaloidal, flavonoid, coumarin, amino acid, triterpene and the essential oil compounds. Different chromatographic conditions were developed for each compound-based investigation. The tests were found negative for essential oil, triterpene and alkaloidal compounds. However, it gave positive test result for flavonoid, coumarin and amino acid compounds. The test result in case of amino acid was too weak and may need further confirmatory test.
For flavonoid test, it gave clearly a positive result as seen in the Thin Layer Chromatography (TLC) Plate (Fig.3).

**Fig.3:** TLC plates for flavonoid

### Chromatographic conditions

- **Stationary phase**: TLC plates silica gel 60 F254 (Merk)
- **Mobile phase**: Ethyl acetate: Formic acid: Acetic acid: water (100 : 11 : 11 : 27)
- **Sample applied**: 5µL volumes of test solutions
- **Sample tracks**: Track 1 = *Brag-zun*
  Track 2 = *Tribulus terrestris* (standard)
  Track 3 = Standard (Rutin, Chlorogenic acid, Isoquercitin, Quercitin)
- **Detections**: A = UV 366 nm, after derivatization with natural products reagent/PEG.
  B = DPPH spray reagent and examined in visible light after drying.
**3.2 Antifungal activity**

Samples Received: 19th February 2008.

Date of Analysis: February 20, 22, 27, 29, March 3, 6, 10, 17, 18, 24, 28, 31, April 4, 17, 23, May 3, 12, 20.

Test Sample B: Dark brown viscous liquid.

Objective: To test antifungal activity against dermatophytes.

Sample Preparation: The test samples were dissolved in water (40 mg/ml) and filtered aseptically.

Test Method 1: MIC (Minimum Inhibitory Concentration) by broth microdilution test.

Concentrations tested were 0.625, 1.25, 2.5, 5, 10, 20 mg/ml.

Test Method 2: MFC (Maximum Fungicidal Concentration) by growing on SDA Plate.

Concentrations tested were 0.625, 1.25, 2.5, 5, 10, 20 mg/ml.

Fungal strains: Candida albicans CDCB.385, Trichophyton mentagrophytes, Microsporum gypseum.

Reported Date: 21st May 2008.

Test Results: From the test, it was found that Brag-zun was inactive.
against *Candida albicans* and *Trichophyton mentagrophytes*. However, it gave positive test against *Microsporum gypseum* with IC<sub>50</sub> value of 0.625 mg/mL (Table 2).

Table 2: Test result of the antifungal activity of Brag-zun.

<table>
<thead>
<tr>
<th>Analysis</th>
<th>Test Sample</th>
<th>Fungal Strain</th>
<th>Result</th>
</tr>
</thead>
</table>
| 13-51-06819 | BRAGZHUN  
Mfd. 5/2/2008  
Batch No.261 | *Candida albicans* CDCB.385 | Negative for all concentration       |
|            |                                  | *Trichophyton mentagrophytes* | Negative for all concentration       |
|            |                                  | *Microsporum gypseum* | Positive at 0.625 mg/mL               |

3.3 *Anti-oxidant activity*

The *Brag-zun* gave very weak activity with the DPPH determined using the UV Spectrophotometer (Table 3). The TLC was developed and when sprayed with DPPH, it gave positive test for the anti-oxidant activity (Fig. 3, B).

Table 3: DPPH radical scavenging activity of Brag-zun

<table>
<thead>
<tr>
<th>Sample</th>
<th>DPPH IC&lt;sub&gt;50&lt;/sub&gt; (µg/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Brag-zun</em></td>
<td>405.45</td>
</tr>
<tr>
<td>Ascorbic acid (Positive control)</td>
<td>9.70</td>
</tr>
</tbody>
</table>

4. Conclusion and recommendation

*Brag-zun* has been extensively studied and many of the traditional medical claims are being supported by many scientific paper publications in the journals some of which are highly regarded in the international arena. The Bhutanese variety of *Brag-zun* gave positive tests for its chemical compositions (only major classes of compounds), free radical scavenging activity and antifungal activity. The presence of anti-oxidising agent in *Brag-zun* supports the traditional medical claim of boosting the health and increasing the youthfulness. The antifungal activity substantiates the claims of *Brag-zun* being good for ringworm and wounds.

Science has proven that it is a miracle traditional drug. Therefore, it may be a good choice of herbal drug to keep oneself young and healthy. In general, the Traditional Physicians suggest the users to take more cow’s milk during use-period of *Brag-zun*. As it is soluble in milk, its intake helps in proper digestion and assimilation in the body. Spicy and heavy foods are strictly prohibited.

However, some *Brag-zun* that are available in the local market especially those imported ones, may be adulterated with steroids. Therefore, if bought from the local markets, it is cautioned not to exceed its intake for more than 1 week for the fear that the steroids may inflict adverse side effects.
If *Brag-zun* is collected from the rocky cliffs, it is advisable not to over harvest it. This is because it takes minimum 20 years to regenerate. There is need to develop the management plan for this.

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**References**


