

SHILAJIT -A MULTIPURPOSE DRUG OF AYURVEDA: AN OVERVIEW

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Abstract

Shilajit is a multi-component natural occurring mineral substance used in Ayurveda and Siddha systems of medicine which originated in India. Its source can be traced to the mountainous regions, where the hilly tribes first identified its beneficial use. Shilajit is aptly referred to as '*rasayana*'/'*rasayanam*' in Ayurveda and Siddha literature which means rejuvenator because it prevents ailment and enhances the quality of life.

Introduction

Shilajit is a herbomineral drug. It is also known by the names salajit, mumiyo, mineral pitch, asphalt, Jew's pitch, mineral wax, and ozokerite. Shilajit is a gummy, pale-brown to blackish-brown fluid exudated by high mountain rocks, especially in the Himalayas Mountains between India and Nepal. It is also found in Afghanistan, Russia, Tibet, and north of Chile, where it is known as Andean Shilajit. ¹

This 'mountain sweat' is a phytocomplex that has high concentrations of minerals, humus, organic plant materials, and fulvic acid compressed by layers of rocks. The humus consists of 60-80% organic matter and tastes bitter and smells like cow's urine. ^{1&2}

But, shilajit has been used in Ayurvedic medicine for centuries as an anti-aging, healing, and performance-enhancing drug. It is said to 'cure all distempers of the body.' Hence, it is processed and sold commercially in the form of tablets and capsules. ²

Chemical constituents

Shilajit is composed of three primary chemical units namely, low and medium molecular weight non-humic organic compounds comprising free and conjugated (e.g.fattyacyl, aminoacyl, lipoidal), dibenzo--pyrones. Medium and high molecular weight DCPs (dibenzo--pyrones-chromoproteins), containing trace metal ions and colouring matter such as carotenoids and indigoids and metallo-humates like fulvic acids and fusims with dibenzo-- pyrones in their core nuclei (Ghosal, 2006). The chemical content of shilajit is controlled by several factors such as adjacent plant species, geological environment of the rock and soil, temperature, humidity and altitude, etc. ¹⁴ For example, shilajit obtained from India in the region of Kumoan contains a higher percentage of fulvic acids (21.4%) compared with shilajit obtained from Nepal (15.4%), Pakistan (15.5%) and Russia (19.0%). However, the bioactive low molecular compound was found in high quantities

in shilajit obtained from Nepal. Similarly, humic constituents in shilajit samples obtained from these countries also varied. ¹³

Marketed Formulations of Shilajit:

Sr. No.	Companies Name	Dosage form	Quantity	Price (Rs.)
1.	Dabur	Capsule	100cap	380
2.	Patanjali	Capsule	20cap	170
3.	Himalaya	Powder	15gm	489
4.	iAyur	Powder	200gm	1249
5.	Divya	Powder	20gm	99
6.	Jain	Tablet	60tab	322
7.	Nutriherbs	Capsule	90cap	1282
8.	Biotrex Nutraceutical	Powder	200gm	300
9.	Bliss Welness	Capsule	60cap	639
10.	Upakarma Ayurveda	Paste	15gm	1233

Uses of Shilajit in Traditional Medicine:

Shilajit has an important and unique place in traditional texts such as Ayurveda Siddha and Unani medicine. Shilajit is prescribed to treat genitourinary disorder, jaundice, gallstone, digestive disorders, enlarged spleen, epilepsy, nervous disorder, chronic bronchitis, and anemia. Shilajit is given along with milk to treat diabetes. Shilajit has also been ascribed a potent aphrodisiac property. According to Ayurveda, shilajit arrests the process of aging and produces rejuvenation which is two important aspects of an Ayurvedic rasayana. Shilajit is useful for treating kidney stones, oedema, piles, internal antiseptic, adiposity, to reduce fat and anorexia. Shilajit is prescribed along with guggul to treat fractures. It is believed that it goes to the joints and forms a callus quickly. The same combination is also used to treat osteoarthritis and spondylitis. Shilajit is also used as yogavaha (yogavaha is an agent which enhances the property of other drugs). Shilajit is soaked in the decoction of one or more of the following plants as this are said to increase their efficacy: Shoriarobusta (sala), Bachanania lactifolia (piala), Acacia farnesiana (acacia), Terminalia tomentosa (asana), Catechu nigrum (catechu), Terminalia chebula (myrobelan) and Sida cordifolia (bala). Work has recently been initiated to further investigate this property of shilajit.

Preclinical Research on the Activity of Shilajit:

Immunomodulatory activity

The study shows that humification of latex and resin-bearing plants is responsible for the major organic mass (80-85%) of shilajit. The low mol. wt. chemical markers (<10%), viz. aucuparins, oxygenated dibenzo-K -pyrones and triterpenic acids of the tirucallane type (free and conjugated), occurring within the core structure of shilajit humus, are the main active constituents of Himalayan shilajit. The therapeutic effects of shilajit are the results of hormonal control and regulation of immunity.^{13 & 14}

Antiulcerogenic and Anti-inflammatory Studies with Shilajit

Shilajit was found to possess both these activities in different models of experimental peptic ulcer and inflammation. The observed antiulcerogenic effect of shilajit in pylorus-ligated, aspirin- and immobilisation-induced gastric ulcers and cysteamine- and histamine-induced duodenal ulcers is in accordance with the suggested use of shilajit in peptic ulcer.¹⁵

Effects of Shilajit on Memory, Anxiety and Brain Monoamines in Rats

Shilajit had significant nootropic and anxiolytic activity. The biochemical studies indicated that acute treatment with Shilajit had insignificant effects on rat brain monoamine and monoamine metabolite levels. However, following subacute (5days) treatment, there was decrease in 5-hydroxytryptamine and 5-hydroxyindole acetic acid concentrations and an increase within the amount of dopamine, homovanillic acid and three .4-dihydroxyphenyl-acetic acid concentrations, with insignificant effects on noradrenaline and 3-methoxy-4- hydroxyphenylethylene glycol levels. The observed neurochemical effects induced by Shilajit, indicating a decrease in rat brain 5-hydroxytryptamine turnover, associated with an increase in dopaminergic activity, helps to elucidate the observed nootropic and anxiolytic effects of the drug.¹⁶

Effects of Shilajit on Biogenic Free Radicals

The radicophilicity (antiradical-antioxidant effects) of processed shilajit (SJP) to oxygen-derived free radicals and nitric oxide (NO), and the attendant H@, cleaving effect were evaluated. SJP provided complete protection to methyl methacrylate (MMA) against hydroxyl radical-induced polymerization and acted as a reversible NO-captodative agent. SJP (20 and 50mg/kg/day, i.p., for 21 days) induced a dose-related increase in superoxide dismutase (SOD), catalase (CAT) and glutathione peroxidase (CPX) activities in frontal cortex and striatum of rats. The data were comparable to those of (-)-deprenyl(2 mg/kg/day, i.p., for 21 days) in respect of SOD and CAT activities. These findings are consistent with the therapeutic uses of shilajit as an Ayurvedic rasuyan (rejuvenator) against oxidative stress and geriatric complaints.¹⁷

Effect of shilajit on blood glucose and lipid profile

Shilajit, a herbo-mineral preparation can give a brand new and promising approach within the semipermanent management of maturity onset DM, due to its varied action. Since it will turn out a higher glycemic management along side improvement within the lipid profile in animals, it's worthy to

do shilajit either as monotherapy or together with alternative medicinal drug agents clinically. Shilajit made important useful effects within the lipid profile in euglycemic rats additionally by reducing TCh and TG and increasing HDL considerably. Therefore, it's doubtless that shilajit-induced favorable changes within the lipid profile in diabetic rats might not solely flow from to higher glycemic management (secondary), however might even be because of its protest on lipid metabolic pathways.¹⁸

spermatogenic and ovogenic effects

Shilajit has been employed in ancient medication as associate aphrodisiac and geriatric tonic. we tend to thought that these effects can be associated with gametogenesis and ovogenesis. we tend to found that the amount of spermatozoon epididymides of the male rats was considerably over within the management. Moreover, a considerably higher blood serum androgenic hormone level was discovered. The serum LH levels increased slightly but there was no change in the serum FSH levels. The increase in the serum testosterone level is responsible for increased spermatogenesis and sperm counts. The final body and organ weights of all groups were similar to the control. it's assumed that Shilajit had dose connected effects on spermiogenesis while not fixing the final organ weights. The administration of Shilajit to rats showed an interesting increase within the variety of spermatozoon of the epididymides in male rats, and within the variety of ovulation-induced rats in females. These spermatogenic and ovogenic results of Shilajit might result from the combined effect of its several constituents, i.e. mineral, humic substance, etc. However, additional analysis are required to spot the active parts of Shilajit.¹⁹

Testosterone is the primary male sex hormone and an anabolic steroid. In male humans, testosterone plays a key role in the development of male reproductive tissues such as testes and prostate, as well as promoting secondary sexual characteristics such as increased muscle and bone mass, and the growth of body hair. If a male has a low level of testosterone, the symptoms can include erectile dysfunction, and reduced bone mass and sex drive.⁶

- Increasing testosterone and FSH levels. Shilajit seems to be a natural booster of both testosterone and follicle-stimulating hormone (FSH) levels.
- Improving semen. Animal and human studies alike indicate improved semen count and function in males.
- Enhancing performance. Supplementation with shilajit appears to reduce fatigue.

Improving spermiogenesis. Shilajit supplementation increased the number of seminiferous tubular cell layers in the testes as well as sperm count in both the testes and epididymis of male rats.⁷

High-Altitude Problems

High altitude issues like drive, acute altitude sickness, high altitude cerebral swelling, pulmonic swelling, insomnia, tiredness, lethargy, lack of appetite, body pain, dementia, and depression could occur once someone or a soldier residing in a very lower altitude ascends to high-altitude areas. These issues arise because of low gas pressure, severe cold, high intensity of radiation, air current rate, and really high fluctuation of day and night temperatures in these regions. These issues could intensify speedily and will typically become grievous. Shilajit may be a herbomineral drug that is pale-brown to blackish-brown, consists of a mucilaginous exudate that oozes from the rocks of the Himalaya Mountains within the summer months. It contains humus, organic plant materials, and humic substance because the main carrier molecules. It actively takes half within the transportation of nutrients into deep tissues and helps to beat temporary state, lethargy, and chronic fatigue. Shilajit improves the power to handle high elevation stresses and stimulates the system. Thus, Shilajit will be given as a supplement to individuals ascending to high-altitude areas in order that it will act as a “health rejuvenator” and facilitate to beat high-altitude connected issues.²⁰

Alzheimer’s Disease

Alzheimer’s disease is a neurodegenerative disorder involving extracellular plaques (amyloid) and intracellular tangles of tau protein. Recently, tangle formation has been identified as a serious event involved within the neurodegenerative process. At present, therapeutic strategies are aimed toward natural phytocomplexes and polyphenolics compounds ready to either inhibit the formation of tau filaments or disaggregate them. However, only a couple of polyphenolic molecules have emerged to stop tau aggregation, and natural drugs targeting tau haven’t been approved yet. Fulvic acid, a organic compound, has several nutraceutical properties with potential activity to guard cognitive impairment. In this work we offer evidence to point out that the aggregation process of tau protein, forming paired helical filaments (PHFs) in vitro, is inhibited by humic substance affecting the length of fibrils and their morphology. In addition, we investigated whether fulvic acid is capable of disassembling preformed PHFs. We show that the humic substance is a lively compound against preformed fibrils affecting the entire structure by diminishing length of PHFs and doubtless working at the hydrophobic level, as we observed by atomic force techniques. Thus, fulvic acid is likely to provide new insights in the development of potential treatments for Alzheimer’s disease using natural products.²¹

Procognitive Activity

Shilajit is a potent and very safe dietary supplement, potentially able to prevent several diseases, but its main medical application now appears to come from its actions in benefit of cognition and potentially as a dietary supplement to prevent Alzheimer’s disease. In essence, this is a nutraceutical product. Considering the expected impact of shilajit applications in the medical field, especially in neurological sciences, more investigations at the basic biological level are necessary, and certainly well-developed clinical trials, in order to understand how its active principles act at molecular and cellular levels.²²

Antiviral Properties

The antiviral activity of Shilajit against a panel of viruses including herpes simplex type 1 and 2 (HSV-1, HSV-2), human cytomegalovirus (HCMV), human respiratory syncytial virus (RSV), human rotavirus (HRV), and vesicular stomatitis virus (VSV). Shilajit is endowed with broad, yet specific, antiviral activity in vitro and constitutes a natural source of antiviral substances. Further work remains to be done to assess its efficacy in vivo. humic acid, a major component of Shilajit, is endowed with antiviral activity.²³

Radiation-Induced Apoptosis on Ovaries

Cancer is that the second leading explanation for death in children in developed countries and most of childhood malignancies are often treated with chemo-radiotherapy. Although radiotherapy may be a successful treatment modality in cancer patients, it's various adverse effects. Especially the gonads are very sensitive and prone to radiation-related damage. Radiation impairs the ovaries by triggering apoptosis of follicular cells and chromosomal damage and oxidative stress. Shilajit contains various antioxidant agents and has ovogenic effects. To evaluate the ability of shilajit to prevent radiation-induced ovarian damage. Shilajit was found to be especially effective on amelioration of damage on primordial follicles.²⁴

Cancer Treatment

Cancer is a horrible disease which is leading cause of death after cardiovascular disease. The principal etiological factor for cancer comprises mutagens, toxins, free radicals, radiations apart from many other causes, inflammation can increase the threat of cancer development and progression. Indian medical system i.e., Ayurveda was used as a means for the prevention of the effects of aging and generation of disease. Shilajit is a potent rejuvenator and having adaptogenic action. Since thousands of years many therapeutic assets have been ascribed to it, some pharmacological properties have been verified by modern scientific evaluation. Shilajit has been attributed with many miraculous restorative properties, improve the quality of life and it seemed to cure all diseases.⁹

Humic and fulvic acid have been reported to possess cancer preventive properties. It has been shown that these compounds can inhibit mutagenesis and have free radicals scavenging, photo-protecting, anti-inflammatory and toxic compound removing properties which will inhibit the cancer development. Shilajit is non-expensive, non-toxic compound which may be taken orally. Therefore, it is rational that future clinical studies should focus on examining the efficacy of Shilajit and its active constituents in cancer prevention as an alternative pharmacological agents.¹⁰

Cardioprotective Effects

Nitric oxide is critical for vasodilation. It is used as a chemical messenger by the inner lining cells of blood vessels to signal the surrounding smooth muscle cells. Nitric oxide triggers vasodilation, i.e., widening of blood vessels. As a result, blood flows freely and takes lesser pressure for the guts to pump blood. Shilajit stimulated the discharge of antioxidant enzymes and downregulated the markers of inflammation (C-reactive protein). It also showed a big reduction in cholesterol, LDL, and VLDL levels along side a lift in

HDL levels. As there have been no side effects reported, these signs prove shilajit's cardioprotective properties in humans.⁵

The active organic molecules – fulvic acid and minerals (in their ionic forms) – are the ringmasters of the show. Due to its high permeability, fulvic acid transports minerals across cells. This way, their electrical potency and vitality are preserved

Shilajit boosts metabolism and energy production in the body while maintaining a balance between catabolism and anabolism. It stimulates the immune system and enhances the absorptive and detoxifying capacity of the body.

There are no major side effects documented against shilajit. It is said to be safe for everyone. But consuming it in its crude and unprocessed form is not recommended

Crude shilajit might contain fungal colonies, heavy metals, polymeric quinones (oxidant agents), and free radicals. Ingesting them might cause heavy metal poisoning or undesirable complications.²

Regulate Diabetes and Cholesterol Levels

Shilajit is help in maintaining your blood glucose levels. It reduces the serum lipid levels (total cholesterol and triglycerides) in your body. Also, due to its antioxidant activity, this herbomineral can prevent lipid peroxidation and accumulation by eliminating free radicals. Ayurveda practitioners use ingredients like shilajit, turmeric, neem, amalaki, triphala, bitter gourd, rose apple, bilva leaves, cinnamon, gymnema, and fenugreek along with panchakarma to regulate diabetes. These ingredients 'cleanse' or detox your system when used with a restricted diet, yoga, and breathing exercises.⁴

Corona Virus

Shilajit has been tested for its antiviral properties with positive results. To this date, however, it has not been directly tested for its effectiveness with Coronavirus or COVID-19. It does, however, show some remarkable antiviral activity. In 2015 a study was undertaken to investigate the antiviral activity of Shilajit against a panel of viruses. These included human respiratory syncytial virus (RSV) – also referred to as human ortho pneumovirus (HRSV), human rotavirus (HRV), herpes simplex type 1 and a couple of (HSV-1, HSV-2), human cytomegalovirus (HCMV), and vesicular stomatitis virus (VSV). The results have indicated that Shilajit is endowed with broad, yet specific, antiviral activity and constitutes a natural source of antiviral substances. Shilajit's remarkable properties include the power to support the system. But Shilajit doesn't just boost your immunity; it adjusts and optimises your entire immune system depending on what you require.¹²

Conclusion

Shilajit is a humus rich blackish-brown substance and it is a potent and very safe dietary supplement which is very useful in many diseases and serves as a potent tonic. It is perhaps the best rasayana Ayurveda

hasprescribed. Although these and many other claims of shilajit had been mentioned in ancient texts, they lackedscientific validation. Modern research has validated these claims and has proven shilajit to be a panacea in oriental medicine. Since there are a number of traditional medicines available with varied claims regarding their therapeutic activity, it is necessary that research be undertaken based on modern scientific methods possibly leading to more panaceas in traditional medicine.

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