



RASAYANA THERAPY IN DIABETIC NEUROPATHY

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Received on 06/05/2017

Accepted on 15/05/2017

Reviewed on 08/06/2017

Published on 20/07/2017

ABSTRACT

Neuropathy is the most common complication of Diabetes Mellitus. Main factors playing vital role in development of neuropathy are metabolic as well as vascular which causes degeneration of neurolemma resulting in impaired nerve conduction. It is presented in the patients as Dysaesthesia / Parasthesia.

In Ayurveda Diabetes has been described as '*Madhumeha*' which is a '*Vata*' predominating disease causing derangement of body tissues. '*Vata*' is vitiated either due to '*Dhatu Kshaya*' (quantitative or qualitative loss of tissue factors) or vitiation of vata due to obstruction in microchannels responsible for nourishment and maintenance of tissue factors. As per description available in Ayurvedic literature derangement of body tissues starts much before appearance of characteristic clinical features of '*Madhumeh*'. '*Pani Pad Tala Dah*' (burning sensation in palms and soles) a symptom of afflicted nerve tissue is mentioned as purvaroop (pre diabetic stage) i.e a stage wherein vitiated doshas have just started to effect tissue factors.

'*Rasayana*' is a unique to bring and to maintain the metabolic activities in equilibrium, bringing normalcy in body tissues thus improving resistance and immunity against diseases, prolonging the life, developing the positive health and improving the quality of life. '*Rasayana*' act at the level of '*Dhatus*' (body tissues), '*agni*' (metabolic activities) and '*srotansi*' (micro circulation).

A number of '*Rasayana*' drugs are in use to combat diabetic neuropathy in Ayurveda such as *shilajita*, *Guduchi* etc .Various different researches have been reviewed in order to understand the importance of *Rasayanas* in general health and their uses and the active principles behind the drugs along with their mechanism of action in breaking the pathogenesis of Diabetes and its complications esp. Diabetic neuropathy. Many drugs have been found out having the quality of both the *Rasayana* and anti- Diabetic and also improving the status of its complications

Key words *Rasayana Agni, Madhumeha*

INTRODUCTION

Diabetes mellitus refers to a group of heterogeneous metabolic disorders that share the phenotype of hyperglycemia.¹

The prevalence of diabetes is increasing dramatically in both developed and developing countries. The prevalence as estimated to be 2.8 % affecting 171 million people worldwide, in year 2000. With current trends, the prevalence worldwide is estimated to reach 4.4%, affecting 366 million people by the year 2030. Diabetes and its complications are the major causes of mortality, morbidity and decreased quality of life.²

Diabetic neuropathy is one of the common microvascular complication characterised by sensory abnormalities like paraesthesia,

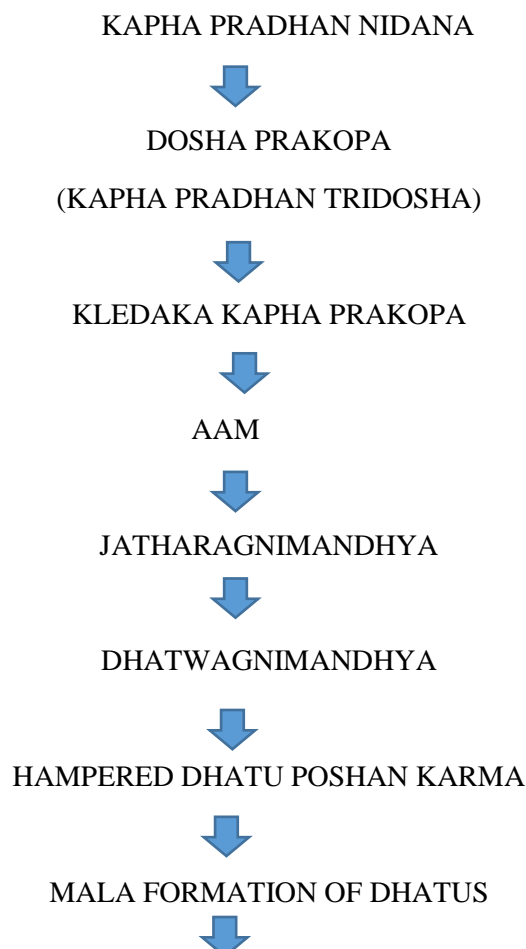
burning sensation, cutaneous hyperaesthesia and numbness and loss of tendon reflexes³

The prevalence of diabetic neuropathy is rising with the global burden of type 2 diabetes given that diabetics effect approximately 246 million people worldwide it is estimated that 20 to 30 million people are affected by symptomatic diabetic neuropathy. Neuropathy is a leading and independent risk factor for mortality and morbidity.²

TYPES OF DIABETIC NEUROPATHY³

- Chronic distal symmetrical sensory – motor poly neuropathy
- Autonomic neuropathy
- Focal/ asymmetrical neuropathies

PATHOGENESIS (SAMPRAPTI) OF DIABETIC NEUROPATHY



BHAHU DRAVA SHLESHMA

BAHU ABADHA MEDA



ABHISHYANDA



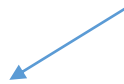
SROTORODHA



AVRAN OF VATA



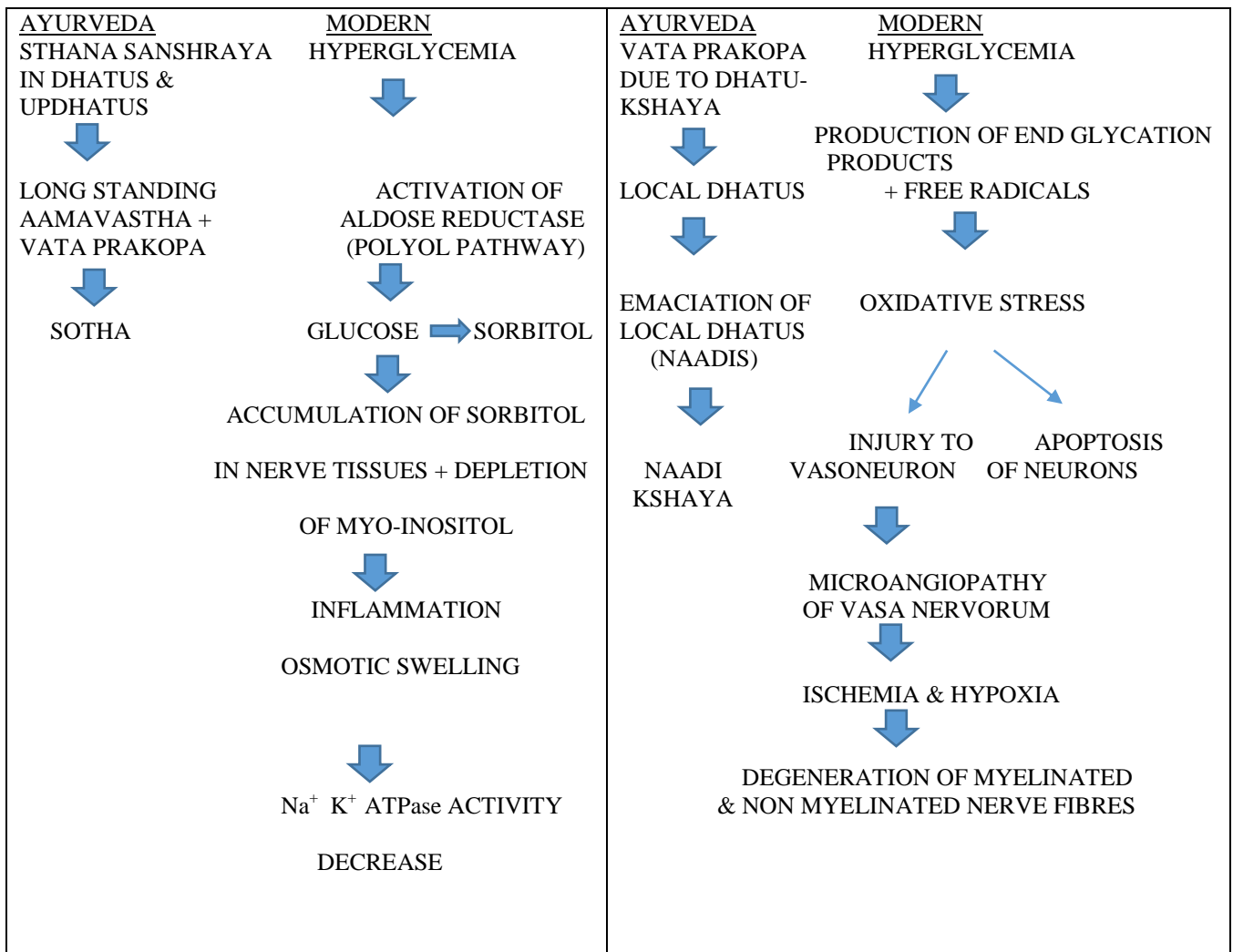
VATA PRAKOPA

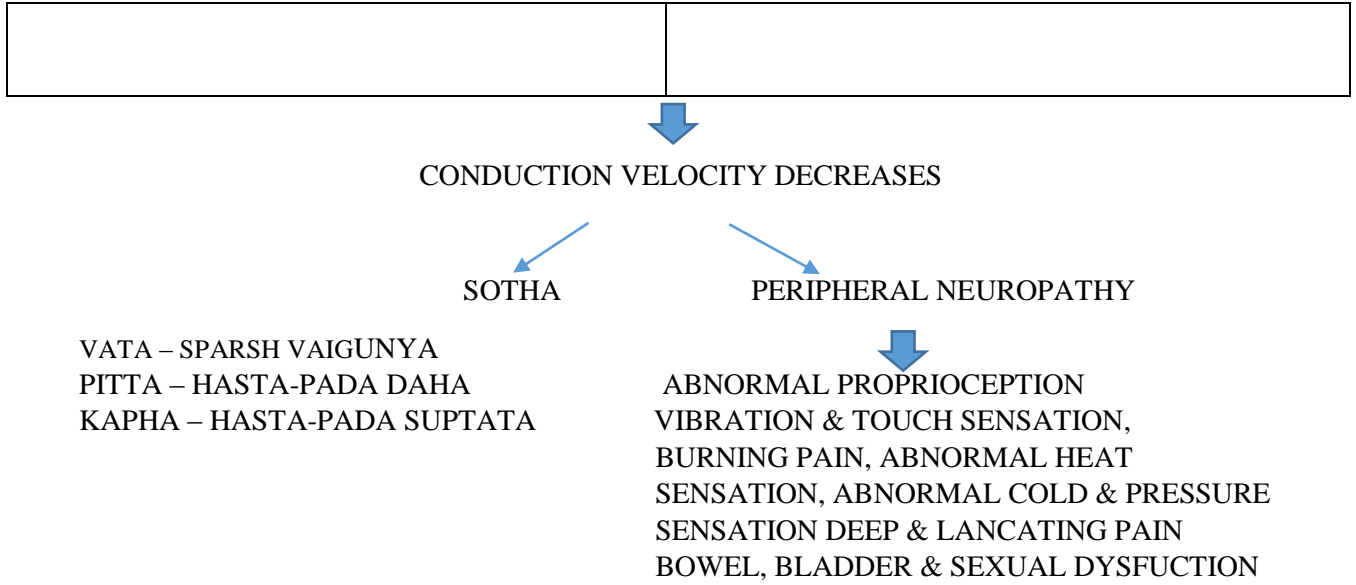


AVARANA



DHATU KSHAYA





Rasayana, is a sanskrit word, with the literal meaning: *Path (āyana) of essence (rasa)*.⁴

Medicines which invigorate a healthy persons and alleviate the diseases are *Rasayanas* (rejuvenators).⁵

Types of Rasayana

- *Pranakamya* – Promoter of vitality and longevity
- *Medhakamya* – Promoter of intelligence.
- *Srikamya* – Promoter of complexion.
- *Naimittika Rasayanas* help to fight a specific disease.

METHODOLOGY

- (I) Critical study of Ayurvedic literature with aim to understand diabetic neuropathy in Ayurveda.
- (II) Internet search on Google, Wikipedia, DOAJ, PUBMED ETC with keywords *prameha, madhumeha, rasayana, Diabetes, Diabetic neuropathy*.

TABLE NO. 1 OBSERVATION

S.NO	NO. OF ARTICLES	NO. OF ARTICLES FOUND SUITABLE
MADHUMEHA	5	4
PRAMEHA	10	8
DIABETES	20	15

DIABETIC NEUROPATHY	10	8
RASAYAN	8	3
TOTAL	53	38

TABLE No.2 RASAYANA USEFUL IN DIABETES AND DIABETIC NEUROPATHY

S No.	Name Of the Research Paper	Properties
1. <i>GUDUCHI</i> Tinospora cordifolia	<i>Anti-Diabetic claims of Tinospora cordifolia. Critical Appraisal and role in therapy.</i> Rohit sharma, Hetal Amin, Galib, Pradeep kumar prajapati. Asian Pacific Journal of Tropical biomedicine.2015;5(1):68-78.	(i)Anti-hyperglycemic (ii)Adaptogenic (iii)Hepeto-pancreato protective. (iv)Hormones regulator.
2. <i>GOKSHUR</i> Tribulus terrestris	<i>α-Glucosidase and Aldose reductase inhibiting activity in vitro and Anti-diabetic activity in vivo of tribulus terrestris.</i> HARMIDER SINGH LAMBA, CHANDER SHEKHAR BHARGAVA, MAYAK THAKUR, SHILPI BHARGAVA. International journal of pharmacy and pharmaceutical sciences. Vol 3, Issue 3, 2011.	α-Glucosidase and Aldose reductase inhibitor
3. <i>SHILAJEET</i> Asphaltum punjabinum	<i>Evaluation of effects of Shilajatu on Madhumeh.</i> World Journal of Pharmacy and Pharmaceutical Sciences Vol 4, issue 07 2015	(i)Ojovardhak (ii)Pramehagna (iii)Agnideepak (iv)Sroto shodhak
4. <i>PUNARNAVA</i> Boerhavia Diffusa	<i>Hypoglycemic effects of Traditional Herbs used in the treatment of Diabetes.</i> Baby Joseph and D.Jini Research Journal of Medicinal plants.5(4) 352-376,2011.	↑ Hexokinase activity ↑ Plasma insulin ↓ Glucose-6- phosphatase
5. <i>VIJAYSAR</i> Pterocarpus marsupium	<i>Hypoglycemic effects of Traditional Herbs used in the treatment of Diabetes.</i> Research journal medicinal plant 5(4) 352-376,2011	(i)Pterostilbene rejuvenate β cells in pancreas. (ii)Reduces inflammation and insulin resistances
6. <i>SWARNA MAKSHIK</i>	<i>Madhumeh with current evidence and intervention with Ayurvedic rasaushadhi.</i> Das, Banani, Mitra,	(i)Agnideepak (ii)Vrshya (iii)Rakthposhak

	Achintya Hazra, Jayram. Indian Journal of traditional knowledge 10(4): 624-628, Nov 2011. Pub-NISCAIIR-CSIR.	(iv) <i>Yogvahi</i>
7. <i>ATIBALA</i> Abutilon indicum	<i>Anti-diabetic activities of Abutilon indicum are mediated by enhancement of adipocyte differentiation.</i> Chut wade krisanapun, Seong-holee, Penchom Peungvicha, Rungravi temsirirkkul, Seung joon back. Evidence based complementary and alternative medicine. Vol 2011 article 1 D 167684.	(i) Improves insulin sensitivity (ii) Glucose transport-1 promoter activity (iii) Analgesic

Review of Rasayana and their effects on Diabetes and its complications.

GUDUCHI

1. *Tinospora cordifolia* (*Guduchi*) is found to be effective in hyperalgesia in experimental Diabetic neuropathy in streptozotocin induced diabetic rats. Aldose reductase inhibitory activity of *Guduchi* has also been found in-vitro.⁶

2. The different alkaloids like Magnoflorine, Palmetine, Jatrorrhizine,⁷ tannins, cardiac glycosides, flavonoids, saponins, etc.⁸ present in *Guduchi* (*Tinospora cordifolia*) have anti-diabetic activity.

3. Aerial part of *Tinospora Cordifolia* may contain phytoconstituents like alkaloids, glycosides, flavonoids, steroids and terpenoids. The analgesic activity of *Guduchi* (*Tinospora Cordifolia*) is due to the various flavonoid present in it which inhibits the production of prostaglandins,⁹ hence reduces the inflammation. Also its stem contains methanol which decreases the activity of SOD, GPx in alloxan induced diabetic rats.^{10,11} Leaf extract of *Guduchi* (*Tinospora Cordifolia*) contains saponarin (an alpha-glucosidase inhibitor) which has a significant role as an antioxidant and hydroxyl radical scavenging activity.¹² All these

constituents helps in reversing the pathogenesis of the Diabetic Neuropathy.

4. The plant *Guduchi* (*Tinospora cordifolia*) has also been shown neuro-protective action by initiate the antioxidant system in rat hippocampal slices subjected to oxygen glucose deprivation.¹³

GOKSHURA

1. It has been found that when streptozocin induced diabetic rats were treated with *T. alatus* extract and *T. terrestris* extract the atrophied and degenerated beta – cells of pancreas were normalized when monitored histopathologically. But *t. alatus* showed its mechanism more than *T. terrestris*.¹⁴

2. Phytochemical analysis of *Gokshura* (*Tribulus Terrestris*) shows that it contain many major constituents like flavonoids, steroidal saponins, alkaloids, lignanamides which are found useful in the treatment of diabetes mellitus.¹⁵

PUNARNAVA

1. The extract of leaves of *Punarnava* (*Boerhaavia diffusa*) causes reduction in blood glucose as it rejuvenate beta cells of pancreas which has been shown in experiments on streptozotocin-induced NIDDM rats.¹⁶

2. *Punarnava* (*Boerhavia diffusa*) contain alkaloid punarnavaine, punarnavoside which increases the hexokinase activity, decreases glucose 6 phosphatase and fructose bi- phosphatase activity in glucose metabolism. Also it increases plasma insulin levels.¹⁷

3. The roots of *Boerhavia diffusa* L. possess diuretic action, anti-inflammatory. Its leaf extract has hypoglycemic effects. the effects of *B. diffusa* leaf extract on antioxidant in liver and kidney of alloxan diabetic rats are reported.¹⁸

The *B. diffusa* leaves are rich in alkaloids and sterols including ursolic acid, hypoxanthine-9-L-arabinofuranoside, punarnavine 1 and 2, myricyl alcohol, myristic acid and quinolizidine alkaloids³³. These compounds may be responsible for the antioxidant and antidiabetic activity of *B. diffusa* leaves, which may be attributed to its protective action on lipid peroxidation and to the enhancing effect on cellular antioxidant defense contributing to the protection against oxidative damage in alloxanized diabetes.¹⁸

VIJAYSAR

1. Vijaysar (*pterocarpus marsupium*) shows inhibition of ALR (aldose reductase) the alcoholic extract of *P. marsupium* prevents the accumulation of intracellular sorbitol.¹⁹ which in turn reduces the injury to the nerve cells and prevent diabetic neuropathy. Alcoholic extract showed remarkable antioxidant activity and/or free radical scavenging activity, antiglycation, property.¹⁹

SWARNA MAKSHIKA

1. Age-Related macular degeneration Study-based micronutrients inhibit the development of diabetic retinopathy in rodents by inhibiting oxidative and nitrate stress. The use of minerals like vanadium, chromium, magnesium, zinc, selenium, copper and vitamins or cofactors

(tocopherol [vitamin E], ascorbic acid [vitamin C], ubidecarenone [ubiquinone; coenzyme Q], nicotinamide, riboflavin, thioctic acid [lipoic acid], flavonoids) are advised in diabetes, with a particular focus on the prevention of diabetic complications.²⁰

2. Swarna makshika is found to be effective in lowering blood sugar levels²¹.

ATIBALA

1. *Atibalamula* shows highly significant reduction in the symptoms of Diabetic neuropathy including numbness, tingling, burning sensation and pain in lower limbs in the patients of Diabetic neuropathy.²²

Out of all the *Rasayanas* found effective in Diabetes and Diabetic neuropathy most of the *Rasayanas* work on hyperglycemic condition and lowers the blood sugar levels which in turn prevent the complications of diabetes but *Shilajatu* which is mentioned as a *naimittik rasayana* shows direct effect on breaking the pathogenesis of neuropathy through various pathways.

Detail description of SHILAJATU

Shilajatu as per the word meaning is conqueror of mountains and destroyer of weakness.

Vernacular name²³

English- Black Bitumen, mineral pitch.

Latin- Asphaltum punjabinum or Bitumen judiek.

Sanskrit- *Shilajatu*.

Hindi- *shilajit*.

Pharmacological and Therapeutical Properties of *Shilajatu*:^{24,25}

- *Rasa- Tikta, Lavana, Kashya, Katu.*
- *Guna- Guru, Snigdha, Mrudu, Sheeta.*
- *Veerya- sheeta.*

- *Vipaka- Katu.*
- *Karma- Rasayana, Yogvahi, Sarvaroghara.*
- *Doshprabhava- kaphahara, Tridoshaghna.*
- *Vyadhiprabhava- kaphja roga, Kshaya, Prameha, Pleeha, Gulma, Unmada.*

Chemical composition²⁶

Shilajatu is a humic substance produced by interaction of plants, algae, mosses, microorganisms and also the phytochemistry of vegetation around *shilajatu* bearing rocks constituted an important part. It contains Fulvic acids and Humic acids, phenolic acids, glucose, arabinose, rhamnose and xylose.

Bioactivity of *Shilajatu*

1. Fulvic acid is a strongest chelating agent act as a free radical scavengers. It converts harmful heavy metals into aluminium silicate which is safe for the body. It reduces the risks of degenerative disorders.²⁷
2. *Shilajatu* may be associated with correction of blood glucose level and lipid regulation in circulation. Experimental studies reveal that may be associated with phenomenon of reducing direct sugar and lipid from gut, thereby affecting the overall metabolic syndrome.²⁸
3. The anti-stress activity of these compounds was suggested by their augmentation of murine swimming endurance exercises. The results obtained till now are sufficiently impressive to warrant expectation that the *Ayurvedic Rasayana, Shilajit*, as more effective than several currently available clinically efficacious immunomodulators.²⁹
4. *Shilajatu* is a *rasayan dravya*. It has very important role in *mootravaha strotas*. *Shilajatu* acts as diuretics and antioxidant. New research shows *shilajatu* contain 85 minerals in ionic form and it contains uvic acid, humic

acid, hippuric acid, and benzopyrones. The active principle in *shilajatu* as uvic acid regenerates & prolongs the degeneration of essential nutrients in the cells. Fulvic acid restores electrical balance to damage cells, neutralizes toxins & eliminates food poisoning in a short duration. *Shilajatu* provides iron to the body that are necessary for making the red blood cells (RBC's). It also acts as a stimulant for immune system. It is a strong kidney tonic.³⁰

5. The effect of *Shilajita*, as reported in the *Ayurvedic* literature, seems to suggest its influence on endocrine, autonomic, and brain functional changes. The discovery that these changes can be mediated by cytokines, released by activated immune cells, has opened up possibilities for similar mechanism of action of *Shilajita*.³¹
6. Certain combinations of the phenolic and triterpenoid constituents and the fulvic acids of *Shilajita* produced significant effects against restraint stress-induced ulcers. Similar anti-inflammatory, analgesic, anti-diabetic, immunomodulatory, anti-anxiety proper-ties of *Shilajita* have been seen.³
7. According to classical texts *Shilajita* is supposed to be the exudates from the top of the mountains, but after chemical analysis it is found to be a plant fossil mostly generated by *Euphorbea royalena* and *Trifolium repens* and many more bryophytes. It is a mineral enriched adaptogen. It has nearly 85 ionic minerals and mainly contains fulvic acid and humic acid.³³

Dose³⁴- For *vyadhi nashana*- Upto 1tula (100 *pala*) sevena. *Rogi* becomes *madhumeh mukta*.

DISCUSSION

Rasayana (rejuvenation therapy) is a therapeutic modality to achieve rasa

(primordial tissue factor) and other *dhatu* par excellence. *Rasayanas* are the drugs to maintain *swasthya*³⁵ (healthy state) and are *urjaa* (vigour). *Swastha* (health) itself is defined as the state of *samdosh*³⁶ (equilibrium of body humours), *sam agni* (equilibrium of metabolic factors), *sam dhatu* (equilibrium of tissue factors) and *sam mala kriya* (adequate balance of excretory factors). It may be achieved only if *Rasayan dravya* act at the level of *dhatu* (body tissue), *agni* (metabolic activities), *srotasa* (microcirculation). *Rasayana* helps in the formation of pure *rasa* through proper digestion of *ahara* taken at *jathragni*, *bhutagni* and *dhatwagni* level. The qualitative excellence achieved at *rasa* (primordial tissue) in turn improves the quality of subsequent *dhatu*.

Also the *sam agni* ensures *mala pachana* at *dhatu* level which in turn ensures the patency of *srotas* (micro channels) and henceforth improves nutritional supply to the various *dhatu*s. All these together maintain a homeostasis in the body and reduces the risk of disease inside the body.

Diabetic neuropathy is believed to occur due to *Avrana janya vata prakopa*. Vitiating *vata* damages nervous tissues by local inflammatory process (*shoth*) simultaneously *Avrana* causes *sroto avrodh* (obstruction in microchannels) which lead to malformation of preceding *Dhatu* (progressive nutrition of tissues) leads to further *Dhatu kshya* (emaciation at tissue level as well as at microlevels).

Shilajatu (*Asphaltum punjabianum*) is *anamla panchrasa*, *katu vipaka*, *sheeta virya* and *laghu*. It causes *agni deepan* due to its *laghu guna* and *sheeta virya*. It is a *srotosodhak* (cleaning the microchannels) due to its *katu vipaka* and *ojovardhak* (innate immunity) due to its *prabhava*. With these qualities *shilajatu* helps in *pachana* of *doshas* (toxic metabolites) – removes *avrana-sroto shodhana* – pacifies *vata* – reduces nerve tissue degeneration. *Ojovardhana* property of *shilajatu* ensures

dhatu poshan (at cellular level and ultimately causes nerve cell regeneration). Therefore *shilajatu* a *rasayana* may be used as an ideal therapeutic agent to manage Diabetic neuropathy.

CONCLUSION

Rasayan therapy helps to attain optimal physical strength, quality of *dhatu*s, longevity, immunity or *bala* and mental competence. *Shilajatu*, as reported in ayurvedic literature, seem to suggest its influence on endocrine autonomic, and functional changes hence *Shilajatu* as a *rasayana* helps in combating both Diabetes mellitus and Diabetic Neuropathy.

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Source of support: Nil

Conflict of interest: None Declared