



Review Article

A CONCEPTUAL STUDY ON DIABETIC PERIPHERAL NEUROPATHY

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ABSTRACT

The prevalence of diabetic peripheral neuropathy is predicted to increase in future. The persistent hyperglycaemia results in non-enzymatic glycosylation of haemoglobin and results in macrovascular and microvascular complications. Neuropathy is one of the most frequently encountered microvascular complications. It considerably reduces the quality of life, causes disability due to feet ulceration and gait disturbances. Diabetic peripheral neuropathy can be considered as a *Dhatu, Upadhathu pradoshaja vatavyadhi*. As *Vatavyadhi* is mentioned as a *Maharoga*, combined modalities of treatment should be adopted. As microangiopathy is the underlying pathology, here the integrity and function of *Rakthavaha srotas* is distorted, which results in *Avarana of Vata*. To remove this *Avarana kapha pitha shamana* and *Rakta prasadana* are the best treatment modalities. Drugs having *Rasayanaguna* has proven beneficial in restoration of neuronal functions.

INTRODUCTION

In the current scenario, changes in eating habits and sedentary lives have greatly aided the emergence of a number of lifestyle illnesses. One of them is diabetes mellitus, which has risen to become the most prevalent non-communicable disease worldwide. According to a recent report by the Times of India, in India there are 136 million people with pre-diabetes and 101 million people with diabetes in the year 2021^[1]. Diabetes mellitus with a long history causes microvascular and macrovascular problems. One of the most common microvascular consequences is neuropathy. Diabetes neuropathy has a significant impact on patients by raising the risk of falls, producing discomfort, and lowering quality of life (QOL). The prevalence of diabetic neuropathy in Indian population ranges from 19.1% to 29.2%^[2].

Prameha is one among the *Ashtamahagadas*, according to Ayurveda *Acharyas*^[3]. It was described as an *Anushangi roga* by Charaka Acharya in *Sutrasthana* 25th chapter *Yajja purusheeyam*. It is a manageable illness, and stringent *Pathyas* must be adhered to.

Diabetic neuropathy, though considered as an *Upadrava vyadhi*, no direct correlation for it is found in classics. Its symptoms can be found in the *Purvarupa*, *rupa* as well as the *Upadrava of Prameha*. Due to the severity of neuropathy symptoms, it should be considered and treated as a separate *Vyadhi*.

Currently there is no effective treatment available for it, except the tight control of blood glucose. Understanding its proper pathogenesis and planning an effective treatment protocol is therefore of great significance.

Diabetic Peripheral Neuropathy

Diabetic peripheral neuropathy (DPN) is defined as the presence of symptoms and/or signs of peripheral nerve dysfunction in diabetes after the exclusion of other causes (malignancy, chronic alcoholism, nutritional deficiency, infections, iatrogenic etc). Though neuropathy is considered as a late complication, it can even be present at the onset of diabetes mellitus.

Pathogenesis

Symmetric peripheral neuropathy may arise from diffuse microangiopathy or hyperglycemia-induced accumulation of sorbitol and fructose, which causes a myoinositol deficiency. The basement membrane of the tiny blood arteries and capillaries supplying the skin, skeletal muscle, eye, and kidney thickens in microangiopathy. Recurrent hyperglycemia is the pathophysiology of microangiopathy and

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diabetic neuropathy. The basement membrane thickens as a result of increased glycosylation of other proteins, including collagen and hemoglobin. Segmental demyelination, schwann cell destruction, and axonal damage are the basic pathological changes in neuropathy.

Clinical Presentation

The nerve fibers that get affected include small fibers, large fibers, motor and autonomic fibers. Most axonal neuropathy follow a stock glove pattern with sensory symptoms (small fiber more than large fiber) dominating over motor symptoms and the distal reflexes are usually absent. Most demyelinating neuropathy affect the motor fibers and sensory fibers equally (large fibers more than small fibers) and areflexia and hyporeflexia is more generalized. Symptoms of large fiber neuropathy include numbness, pins and needles, tingling and poor balance and the signs include decreased vibration, joint position sense and reflexes. Symptoms of small fiber neuropathy include pain which is burning, shock like, stabbing, pricking, shooting and lancinating in nature along with allodynia and the signs include decreased pin prick and temperature sensation.

Ayurvedic Concept of Diabetic Peripheral Neuropathy

Ultimate aim of Ayurveda is *Swasthasya swasthya rakshana* (protecting those who are healthy) and *Athurasya vyadhi prasamanam* (curing diseases of those afflicted by disease). Acharya Susruta defined *Swastha* as an equilibrium state of *Dosha*, *Agni*, *Dhatu* and *Mala* along with *Prasanna athma*, *Indriya* and *Mana*.^[4] Though *Prameha* is a *Vasti asraya roga*, its macrovascular complications like cerebrovascular accidents, coronary artery diseases and microvascular complications like diabetic neuropathy, retinopathy and nephropathy affects the *Trimarmas*, *Janendriyas* and *Karmaindriyas*. Taking all these aspects into consideration, diabetic peripheral neuropathy can be considered as a *Bheda avastha* of *Prameha*, manifested as a *Vatavyadhi*. A direct correlation for diabetic peripheral neuropathy cannot be found in our *Samhitas*. Features such as *Karapadadaha* (burning sensation of hand and foot), *Pipeelika sancharamiva* (tingling sensation), *Supti/Swapa* (numbness), *Sosha* (wasting), *Angasada* (weakness) are seen either in the *Purvaroopo* or *Roopa* or *Bheda avastha* of *Prameha* can be correlated to symptoms of diabetic peripheral neuropathy. Due to maximum *Dosha -Dushya*, patient of *Prameha* is prone to many complications. The disease involves *Upadravas* affecting the *Marmasthanas* of the body. *Prameha Upadravas* are difficult to treat as stated by Acharya Sushruta that patient of *Prameha* dies usually due to its *Upadravas*. Thus, it should be considered as a *Prabala swatantra vyadhi* and treated accordingly.

Nidanam

Prameha upadravas are caused due to following reasons

- *Prameha upekshaya* – Improper treatment
- *Prameha atiyoga* – Persistent hyperglycemia leads to advanced glycation end products and this leads to various macrovascular and microvascular complications.
- *Dushtamedas* – BMI is directly related to diabetic peripheral neuropathy.
- *Dhathukshaya* and *Vatakopa*– *Vata pradhana* symptoms are more seen in DPN.
- *Kapha pitta dushti* – This leads to the structural damage of peripheral nerves.

Samprapthi

According to modern literature, pathogenesis of diabetic peripheral neuropathy is related to the high concentration of glucose in blood, which resulted in metabolic disturbances to increase the endoneural vascular resistance. In chronic diabetes, demyelination occurs resulting in structural damage to nerves. In the ischemic pathogenesis of DPN, a patchy multifocal pattern of fiber loss is seen. Lipotoxicity and glucotoxicity is occurring in the underlying pathology, which can be considered as a *Dushi visha*. This *Dushi visha* results in a *Rakta dushti*. Further indulging in *Apathya sevas*, *Prameha* becomes complicated and the *Dhathu sarata* is eliminated through urine and finally *Oja kshaya* occurs resulting in *Vata kopa*. This vitiated *Vata* and *Rakta*, leads to *Raktavaha srotodushti*. The vitiated *Rakta* produces obstruction to the flow of *Vata*. In latter course, the obstructed *Vayu* in turn vitiates *Rakta dhatu*. Due to the properties of *Sukshmatwa* and *Saratwa* of *Vayu*, *Dravatwa* and *Saratwa* of *Rakta* they spread all over the body. The spreading is facilitated by *Vyana Vayu*. The vitiated *Rakta*, further obstructs the *Vata*, leading to a *Vata kopa*. There is also *Vata kopa* occurring due to *Dathu kshaya*. This *Vata* spreading quickly in the *Raktha margas*, produces different type of pain. *Dathu kshaya janya vata kopa* as well as the *Avrana janya vatakopa*, results in a *Vatapradhana tridosha dushti* along with *Rakta dushti* in the *Raktavaha srotas*. Hence DPN get manifested as a *Vatavyadhi*.

Concurrent Ayurvedic Pathologies Having Similar Features of Diabetic Neuropathy

Padaharsham

When the feet have irritating tingling sensation and are felt like sleeping - loss of sensation, it is known as *Padaharsha* and is caused by the aggravation of *Kapha* and *Vata*.

Padadaham

Padadaha is a condition where *Vata* along with *Pitta* and *Rakta* creates burning sensation in the feet, particularly in persons who walk long distances.

Prasuptitha

It is one among the *Kshudra rogas* explained by Vagbhata. The Kapha excited and displaced by Vata enters the skin and undergo *Sosha*. The skin becomes *Pandu varna*, *Vichetana*, *Alpa kandu* and *Avikleda*. Due to its loss of sensation, it is called *Prasupti*.

Supthi Vatam

Though it is not mentioned as a disease as such. *Suptivata* is found among the indications of formulations like *Shundibaladwaya kwatha*.

Treatment

As diabetic peripheral neuropathy is considered to be an *Upadrava vyadhi* of *Prameha*, *Prashamana* of *Pradhana vyadhi* itself leads to the *Upadrava prashama*. Thus *Prameha chikitsa* is to be done initially. Once the blood glucose level gets controlled, the symptoms of neuropathy disappear. In *Stoola pramehi*, *Shodhana chikitsa* can be done where as in *Krishna pramehi samana chikitsa* can be adopted. If the neuropathy symptoms are not subsided by the *Prashama* of the *Pradhana vyadhi*, then a separate treatment protocol has to be evolved.

As microangiopathy is the underlying pathology, DPN has to be considered as a *Upadathu pradoshaja vatavyadhi* as a result of *Raktavaha sroto dushti*. Moreover, symptoms of DPN can be observed in the *Poorvaroopo* of *Kushta*, *Uthana vatarakta*, *Rakta gata vata* and *Pada daham*. Hence a *Raktaprasadana chikitsa* has to be employed as the first line of management followed by *Vatahara* management. If the patient presents more of *Kapha medo* predominant symptoms like *Harsha*, *Supthi*, *Shaithya*, then *Urusthambha chikitsa* can be administered. In the context of *Vatarakta*, it is mentioned that if *Vatarakta* is associated with *Kapha* or *Medo avarana*, initially *Kapha medo hara chikitsa* followed by *Rakta prasadana* and *Snehana* therapy has to be employed. *Chikitsa* can be broadly classified as *Anthaparimarjana* and *Bahiparimarjana*

Anthaparimarjana Chikitsa

This can be discussed as *Shodhana chikitsa* and *Samana chikitsa*.

Importance of Shodhana

If the patient has enough *Bala* and there is excessive accumulation of *Kleda*, then the patient should be given *Shodhana* therapy.

Snehana^[5]

Since DPN is *Vata pitta* or *Tridosha pradhana avastha*, *Snehana* therapy is important. *Bheshajas* which are *Raktaprasadana* as well as *Vatashamana* should be taken. Considering this aspect *Dhanwanthara ghrita* mentioned in *Prameha chikitsa* can be selected. Since it is indicated in *Vatashonitha* as well as *Kushta*, it acts as *Prameha hara* as well as *Raktaprasadana*. If the DPN symptoms are

predominantly *Vata paithika* like *Daha then Tiktaka ghrita*, *Panchatiktaka ghrita*, *Mahatiktaka ghrita* can be used. If the symptoms are more *Vata kapha* predominant like *Supthi* then *Guggulutiktaka ghritam*, can be used. If the symptoms are more *Vata* and *Pitta* predominant like *Toda*, *Sula*, *Daha* etc then *Tiktaka ghritam*, *Mahatiktaka ghrita* etc can be used.

Swedana

Though *Prameha* is a *Swedana* contraindicated condition, *Mridu sweda* can be done. *Mridu sweda* like *Taila dhara*, *Ksheera dhara*, *Takradhara* and *Dhanyamladhara* can be employed judiciously as per the condition. *Upanaha sweda* is also indicated.

Shodhana

Since the main *Doshas* that are vitiated is *Vata* and *Rakta*, *Virechana* as well *Vasti* is to be done. If there is *Utklishta Avastha* of *Kapha* (excessive accumulation of *Kapha*), then *Vamana* can be done.

Virechanam^[6]

Virechana is the ideal treatment for *Paithika vikaras*. It eliminates both *Pitta* and *Kapha*, *Prameha* being a *Kapha pitha dushta vikara*, excessive *Kleda* and *Kapha pitta* can be eliminated by *Virechana*. In its complicatory phase like neuropathy, there are predominantly *Vata paithika* symptoms. Considering this aspect, *Manibhadra gulam*, *Kalyana gulam* etc can be given. In case of *Krura koshta*, a feature of autonomic neuropathy, *Snigdha virechana* can be given with *Eranda tailam* and *Sukumara eranda taila*. *Virechana* brings about *Kapha pitta samana* and *Vata anulomana*. Therefore, it is effective in restoring the functions of peripheral nerves.

Vasthi^[7]

Vasti is the supreme treatment for *Vatika rogas*. *Madhutailika vasti* which is specifically indicated in *Prameha* is widely used in clinical practice. Moreover it is having a *Rasayana* property. Thus it can be effectively used in this complicatory phase where *Vatasamaka*, *Rasayana* and *Brimhana chikitsa* should be employed. There is no treatment modality equivalent to *Ksheeravasti* in the management of *Paithika vatarakta*. Underlying pathology in DPN is the distortion of the *Raktavaha srotas*. Moreover in burning neuropathy, *Paithika vatarakta chikitsa* can be adopted. Thus *Panchatikta ksheeravasti*, *Nyagrodhadi gana ksheeravsti* etc can be done. *Yapana vasti* like *Mustadi yapana vasti* are also effective in this condition. *Mustadi yapana vasti* can be done by taking *Yashti kalka*.

Rasayanam^[8]

Rasayana chikitsa is the best means of keeping *Rasadi dhatus* in excellent condition. After proper *Shodhana*, *Rasayana chikitsa* can be given, *Bhallataka rasayana*, *Ayapatra triphala rasayana*, *Ksheerabala tailam*, *Silajathu rasayana* can be given in DPN.

Bahiparimarjana Chikitsa

In *Rakta avruta vata*, Vagbhata has advised to adopt the *Vatarakta chikitsa*. The symptoms of diabetic peripheral neuropathy may be correlated with the stage of *Uthana vataraktam*. The treatment protocol of *Uthana vatarakta* including *Alepana*, *Abhyanga*, *Parisheka*, *Upnaha* can be adopted here. Since *Sweda karma* is contraindicated in *Prameha*, a *Mridu sweda* like *Drava sweda* should be done. Since it is a *Kapha*, *Medo dushti pradhana roga*, *Urusthambha chikitsa* can be adopted, *Rukshana*, *Apatarpana* and *Medohara chikitsa* is to be done. After *Kapha medohara chikitsa*, *Vatahara chikitsa* is to be adopted. *Sneha* and *Sweda* are the main line of management of *Vatavyadhi*. *Harsha*, *Toda*, *Ruk*, *Ayama*, *Sopha*, *Sthambha* and *Graha* can be relieved by proper sudation. Since *Swedana* is contraindicated in *Prameha*, *Mridu swedana* in the form of *Parisheka* and *Upanaha* can be done.

Parisheka sweda**Dhanyamladhara^[9]**

Dhanyamla being *Amla rasa*, *Laghu snigdha teekshna guna*, *Ushna veerya*, act as *Srotoshodaka* and *Vatanulomana*. It cleanses the body channels and improves the blood circulation. Thus it can be used in increasing the peripheral circulation and relieving the symptoms of DPN. Owing to its *Hima Sparsha guna* (cold to touch), it is widely used in relieving burning neuropathy

Takradhara^[10]

Takra possesses *Amla varjitha pancha rasa*, *Ushna virya*, *Amla vipaka* and is *Vata kapha samaka*. *Takradhara* is effective in ailments like *Unmada*, *Prameha*, *Kushta*, *Sirodaha*, *Nidransaha* etc. Various researches have proved that *Takradhara* can reduce the blood glucose and cortisol levels. *Takradhara* is having *Sama sitoshna* and *Sthambhana* properties. Aggravated *Ushna* and *Sara guna* of *Pitha dosha* is coming to normalcy by *Sita* and *Sthambhana* property. *Pitha* is a major factor helping in endocrine secretion by its *Ushna* and *Sara* property. *Vata dosha* helps in movement for proper functioning of all endocrine secretions by its *Chalaguna*. So when cortisol level increases, *Vata pitha dosha* vitiation occurs. *Takradhara* can relieve this *Vata pitha dosha kopa* by its *Sita sparsa* effect, *Sthambhana* effect and procedural effect of *Dhara*. Also, *Takradhara* gives relaxation to neural impulses which cause shortening of CRH and it is controlling the ACTH production along with vasopressin and helps to reduce plasma cortisol level. The cumulative effect of all these cause reduction of symptoms of DPN after *Takradhara*.

Ksheeradhara

Dasamoola ksheeradhara, *Karaskara ksheeradhara*, *Panchatikta ksheera dhara* etc., which

are mainly *Vata pitta shamaka* can be employed in burning neuropathy.

Kashaya Dhara

Dasamoola kashayadhara, *Majishtadi kashaya dhara*, *Panchatikta kashaya dhara*, *Guluchyadi kashaya dhara*, *Nalpamaradi kashaya dhara*, *Eladi Kashayadhara* etc can be used for *Vata shamana* and *Rakta prasadana*.

Upanaha Sweda^[11]

In DPN, there is involvement of *Upadhatus* like *Snayu* and *Sira*, thus *Sanyu* and *Sira gata vata chikitsa* can be employed. In *Snayu*, *Sandhi* and *Sira gata vata*, *Sneha*, *Daha* and *Upanaha* is done. In case of *Supta angatha*, *Raktamoksha* is done followed by smearing of *Taila* processed with *Agaradhooma* and *Lavana*. When there is twisting pain *Upanaha* is to be done.

Udwartanam^[12]

Acharya Vagbhata, has mentioned *Udwartana* in *Prameha chikitsa*. It is a form of *Bahya rukshana*, which helps in *Pachana* of *Dushita doshas* and increases *Agni* at the level of *Bhrajaka pitta* in *Twak*. *Udwartana* has the following properties - *Kaphahara*, *Medasaha pravilayana (Dravikaranam)*, *Siramukha viviktatva*, *Gouravahara* and *Sthirikarnam anganam*. It is considered as *Parama twak prasadakara*. *Udwartana* opens the minute channels and improves blood as well as lymphatic circulation. *Udwartana* is *Kapha*, *Vata hara* and removes *Aavarana* and *Srotorodha*. With the property of *Siramukha viviktatva* it opens up the peripheral channels and improves peripheral circulation. Owing to its *Kapha medohara* property it is found to be effective in reducing the numbness in DPN.

Abhyanga^[13]

In case of *Daha sula* predominant DPN, *Madhuyashtyadi taila*, *Balaguluchyadi taila*, *Chandanadi taila*, *Ksheerabala taila*, *Pindataila* can be used. If it is more *Vata* predominant, *Prabhanjanam taila*, *Sahacharadi taila* etc can be used.

CONCLUSION

Diabetic peripheral neuropathy may be considered as a *Pradhana vyadhi* rather than a *Upadrava vyadhi*. Thus a separate treatment protocol should be adopted. *Antha parimarjana chikitsa*, *Bahiparimarjana chikitsa* along with *Rasayana chikitsa* is found to be effective in the management of diabetic peripheral neuropathy.

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