

AN INTEGRATIVE APPROACH IN THE MANAGEMENT OF DIABETIC PERIPHERAL NEUROPATHY: A REVIEW.

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ABSTRACT

Diabetic Peripheral Neuropathy (DPN) is a common and debilitating complication of Diabetes Mellitus, characterized by progressive nerve damage leading to pain, numbness, and sensory significantly to morbidity and reduced quality of life. Clinically, DPN presents with diminished vibration perception and impairment of multiple sensory modalities. Chronic hyperglycaemia plays a central role in its pathogenesis through oxidative stress, microvascular damage, and nerve ischemia, ultimately leading to neuronal degeneration and complications such as foot ulceration and gait disturbances. In Ayurveda, the clinical features of DPN can be correlated with *Suptata* (numbness) and *Daha* (burning sensation), described under *Poorvarupa* and *Upadrava* of Prameha. It can be considered a form of *Dhatu Upadhatu Pradoshaja Vatavyadhi*, wherein *Vata Dosh*a predominates. The underlying pathogenesis involves

Dhatukshaya (tissue depletion) and *Margavarana* (channel obstruction), with the involvement of *Pitta*, *Kapha*, and *Meda dushya*. Despite advancements in conventional therapy, management remains largely symptomatic with limited success in preventing disease progression. An integrative approach combining modern medicine with Ayurvedic principles may offer a more comprehensive strategy by addressing both symptoms and underlying pathology, thereby improving patient outcomes and quality of life.

KEYWORDS: Prameha, Prameha Upadrava, Diabetic Peripheral Neuropathy, Neuropathic pain.

INTRODUCTION

The rapid socio-economic change in conjunction with urbanization and industrialization are the major factors for the global increase in the Diabetes epidemic, with other associated risk factors such as population growth, unhealthy eating habits, and a sedentary lifestyle also playing an important role^[1] Diabetes Mellitus is a chronic metabolic disorder characterized by persistent hyperglycemia resulting from defects in insulin secretion, insulin action, or both. In India DM is expected to rise to over 134 million by 2045.^[2] It has emerged as a major global health concern due to its rapidly increasing prevalence and associated complications. Among these, Diabetic Peripheral Neuropathy (DPN) is one of the most common and debilitating microvascular complication. Microvascular complications include Neuropathy, Retinopathy, and Nephropathy. The growing prevalence of Type 2 Diabetes Mellitus throughout the world will result in a larger number of individuals suffering from DPN. World health organization, globally estimates about 422 million adults are living with Diabetes Mellitus.^[3] DPN occurs in 50% of individuals with long standing Type 1 and Type 2 DM.

AIMS AND OBJECTIVES

1. To study the literature on Diabetic Peripheral Neuropathy through Modern and Ayurveda.
2. To study the treatment aspect of Diabetic Peripheral Neuropathy according to Ayurveda.

Diabetic Peripheral Neuropathy with Associated Neuropathic pain

According to American Diabetic Association, DPN is defined as the presence of symptoms or signs of peripheral nerve damage in people with Diabetes after exclusion of other potential causes, this leads to peripheral nerve degeneration.^[4] Diabetic Peripheral Neuropathy is a common microvascular complication of Diabetes Mellitus, characterized by progressive damage to the peripheral nerves due to long-standing hyperglycaemia and metabolic disturbances leads to varying degrees of numbness, tingling, aching, burning sensation, weakness of limbs, hyperalgesia, allodynia and pain.^[5] DPN is a leading cause for disability due to foot ulceration and amputation, gait disturbances and fall related injury. Approximately 20-30% of patients with DPN suffer from Neuropathic pain.^[6,7] Neuropathic pain has been characterized as superficial, deep-seated, or severe, unremitting pain and exacerbation at night. Distal symmetric polyneuropathy is the most common clinical

manifestation of Diabetic Peripheral Neuropathy with exhibited stocking and glove distribution.^[8]

Pathogenesis

Chronic hyperglycaemia initiates a cascade of metabolic and vascular disturbances that contribute to Diabetic Peripheral Neuropathy. Excess intracellular glucose activates the polyol pathway, leading to sorbitol accumulation, osmotic stress, and impaired nerve conduction. Simultaneously, formation of advanced glycation end products (AGEs), activation of protein kinase C, and increased oxidative stress cause mitochondrial dysfunction, cellular injury, and endothelial damage. Microvascular impairment reduces blood supply to peripheral nerves, resulting in ischemia and reduced nutrient delivery. In addition, inflammatory mediators further promote Schwann cell dysfunction, demyelination, and axonal degeneration. Collectively, these mechanisms lead to progressive nerve fibre damage, manifesting clinically as sensory loss, paraesthesia, neuropathic pain, and motor impairment.^[9,10]

Symptoms of Diabetic Peripheral Neuropathy:

Distal symmetric polyneuropathy, the most common form of Diabetic Peripheral Neuropathy, typically presents in a characteristic “stocking-and-glove” distribution, initially affecting the feet and lower limbs. The symptoms usually aggravates at night.

Common symptoms include

- Numbness or reduced ability to feel pain.
- Tingling or burning sensation.
- Sharp pain or cramps.
- Increased sensitivity to touch.
- Muscle weakness and diminished reflexes.
- Gait instability.
- In advance cases foot ulcers, infections and bone and joint pain.

Other types of Diabetic Neuropathy

❖ Small Fiber Neuropathy

- Involves small sensory nerve fibres.
- Affects pain and temperature perception.

- Symptoms include burning pain, tingling sensation, allodynia and altered thermal sensation.
- Vibration sense and muscle strength are usually preserved in early stages.

❖ **Large Fiber Neuropathy**

- Involves large myelinated nerve fibres.
- Affects vibration, touch, and joint position sense.
- Patients may experience numbness, imbalance, reduced reflexes, and difficulty walking.
- Advanced cases may develop sensory ataxia and muscle weakness.

❖ **Autonomic Neuropathy**

- Affects autonomic nerve fibres controlling involuntary body functions.
- Can involve cardiovascular, gastrointestinal, genitourinary, and sudomotor functions.
- Symptoms include postural dizziness, constipation, diarrhoea, bladder dysfunction, and sexual dysfunction.

❖ **Proximal Neuropathy (Diabetic Amyotrophy)**

- Primarily affects hips, thighs, or buttocks.
- More common in older adults with type 2 Diabetes.
- Presents with severe pain, muscle weakness, and muscle wasting.
- May cause difficulty in standing or walking.

❖ **Focal or Multifocal Neuropathy**

- Involves a single nerve or multiple isolated nerves.
- Usually has sudden onset.
- Causes localized pain, weakness, or cranial nerve involvement.
- May improve spontaneously over time.

➤ **INVESTIGATIONS**

- Nerve Conduction Study (NCV)
- Electromyography (EMG)
- Monofilament test (10g Semmes-Weinstein Monofilament)
- Vibration perception test (Neurothesiometer)
- Quantitative Sensory Testing (QST)

- Pinprick and Temperature Sensation Testing

➤ Management of DPN

Modern medicine focuses on symptomatic treatment it includes

- Glycaemic control – OHA (Oral-hypoglycaemics), Insulin therapy
- Neuropathic pain management – Pregabalin, Gabapentin, Duloxetine
- Adjunctive medications – Venlafaxine, Tramadol, Tapentadol
- Neuroprotective agents – Methyl cobalamin, Alpha-lipoic acid, Benfotiamine, Acetyl-L-carnitine, vit- D.

Ayurvedic perspective of Diabetic Peripheral Neuropathy as a Prameha Upadrava

Ayurveda is a science of life, ultimate goal is *Swasthasya swasthya rakshana* (maintaining health of healthy individuals) and *Athurasya vikara prasamanam* (managing disease in affected individuals). *Acarya Sushruta* explains that *Swasthya* (Healthy state) is achieved when *Dosa*, *Agni*, *Dhatu*, and *Mala* remain in a state of equilibrium, along with a balanced state of mind, senses, and soul. *Prameha* is one among the *Ashtamahagada vyadhi*, being *santarpanothita vikara* it produces various *Upadras*(complications) such as macrovascular and microvascular. DPN is microvascular one. These complications not only involve body but also conquers *mana*(mind), *Indriya*(senses) and overall physiological and psychological well-being of the individual. As such there is no clearly described disease entity exists in classical *Ayurveda* that directly correlates to Diabetic Peripheral Neuropathy. Based on its clinical presentation DPN can be correlated with *Prameha Upadrava* and certain features of *vata*vyadhi. long standing *Prameha* causes progressive depletion of body tissues and derangement of metabolic processes leading to neurological manifestation. The symptoms which closely resembles to Diabetic Neuropathy includes *karapada daha* (burning sensation in hand and foot), *Pipeelika Sancharavat* (tingling sensation), *Supti*(numbness), *Sosha* (muscle weakness), and *Angasada*(weakness of the limbs) are seen as a *Purvaroop*/*Roopa Avastha* of *Prameha*. Being *Dhatu-Upadhatu pradoshaja vikara* and due to involvement of multiple *Dosa* and *Dushya* it is difficult to manage or *Asadhya* if not addressed in the early stages.

➤ Samprapti

Acarya Charaka explains that *Prameha* is *Bahudrava sleshma Dosavisheshah*. Which means that the excess *kleda* and *kapha* are main causative factors in the disease manifestation. *Samprapti* of *Prameha Upadrava* can be understood by *Dhatukshaya* and *Margavarana*

pathology, as the leading cause for *vatavyadhi* manifestation. *Prameha* is a result of chronic metabolic dysfunction due to intake of *mithya ahara* (unhealthy diet), *mithya vihara* (sedentary life style) and suppression of natural urges leading to *Agnimandya* and *Ama* formation, which in turn vitiates the *kapha* and *meda*. Over time, *ama* along with *kapha* and *meda* causes obstruction to normal movement of *vatadosa* in the *srotas* (microchannels), which results in obstruction to the movement of *vata*, leading the stage for disease progression. As the disease becomes chronic, *Vata Dosha* becomes predominant. Initially, the accumulated *Kapha* and *Meda* obstruct the normal flow of *Vata* a process called *Avarana*. This causes sensory disturbances like numbness, tingling, heaviness, and stiffness, which align with the early symptoms of Diabetic Neuropathy.^[11] In later stages, due to continuous tissue damage and metabolic fatigue, the body's *Dhatu*s (tissues) —especially *Mamsa* and *Majja* — start to degenerate. This condition, known as *Dhatukshaya*, leads to nerve degeneration, burning sensation, sharp pain, and muscle wasting, which closely resemble the progressive stages of DPN.^[12] In addition, *Majjavaha Srotas* (channels that carry marrow and nerve functions) are critically affected, and their dysfunction leads to the defining symptoms of diabetic neuropathy, such as loss of sensation, burning pain, and impaired motor function. The aggravated *Vata*, especially *Vyana* and *Apana*, is responsible for the dissemination and regulation of nerve impulses, and when deranged, causes neurological complications.^[13] From the biomedical perspective, this Ayurvedic interpretation shows notable similarity with the pathogenesis of Diabetic Peripheral Neuropathy, where persistent hyperglycaemia triggers oxidative stress, microvascular compromise, and progressive nerve demyelination, ultimately resulting in peripheral nerve dysfunction.

➤ Samprapti Ghataka

Dosa	Vata pradhana, kapha Pitta
Dushya	Rasa, Rakta, Mamsa, Meda, Twak, Vasa, Ambu, Lasika, Majja, Shukra, Ojas
Agni dushti	Jataragni and dhatwagni mandya
Ama	Jataragni and dhatwagni mandyajanya
Srotas	Raktavaha, Rasavaha, Mamsavaha, Medavaha, Majjavaha, shukravaha
Srotodushti	Sanga and Vimargagamana
Udbhava Sthana	Amapakwashaya
Sanchara Sthana	Sira, Dhamani (mainly), Sarvashareera
Adhistana	Sarvashareera
Vyakta Sthana	Shakha
Vyadhi swabhava	Chirakari

Laxanas According to Ayurveda

The different references of Neuropathy Symptoms of Diabetes are featured as *purvarupa*, *rupa*, and *upadravas* of *Prameha* are as followed

Clinical symptom	Ayurvedic Terminology	Reference
Numbness	<i>Supti - Prameha purvarupa</i>	<i>Charaka Samhita (C.S)</i>
	<i>Twakgata vata</i>	<i>Sushruta Samhita (S.S)</i>
	<i>Karasupti - Prameha purvarupa</i>	<i>Charaka Samhita (C.S)</i>
	<i>Padasupti - Vataja Nanatmaja Vikara</i>	<i>Charaka Samhita (C.S)</i>
	<i>Angasupti - Twakgata Vata</i>	<i>Sushruta Samhita (S.S)</i>
	<i>Sirasupti – Siragata Vata</i>	<i>Charaka Samhita (C.S)</i>
Tingling Sensation	<i>Chumuchumayana - Twakgata Vata</i>	<i>Sushruta Samhita (S.S)</i>
	<i>Roma-Harsha - Kaphayukta Udana</i>	<i>Sushruta Samhita (S.S)</i>
	<i>Harsha / Pippilika - Mamsavrita Vata Sancharana</i>	<i>Charaka Samhita (C.S)</i>
Needing/pricking sensation	<i>Suchiribhiva Nistoda - Shonitavrita Vata</i>	<i>Sushruta Samhita (S.S)</i>
	<i>Suchiribhiva tudyate - Asthiavrita vata</i>	<i>Charaka Samhita (C.S)</i>
	<i>Daha - Prameha Upadrava</i>	<i>Charaka Samhita (C.S)</i>
	<i>Vidaha - Pittaja Nanatmaja Vikara</i>	<i>Charaka Samhita (C.S)</i>

Ayurveda Treatment view of Diabetic Peripheral Neuropathy

In Ayurveda, the management of Diabetic Peripheral Neuropathy aims at correcting Dosha Dushti, nourishing depleted tissues, improving circulation, and restoring nerve function. Since Diabetic Peripheral Neuropathy can be correlated with *Prameha Upadrava* and *Vata Vyadhi*, the line of treatment mainly focuses on *Vatahara*, *Brimhana*, *Rasayana*, and *Srotoshodhana* therapies. The treatment can be broadly classified into *Antahparimarjana Chikitsa* and *Bahirparimarjana Chikitsa*.

1. Antahparimarjana Chikitsa (Internal Therapies)

Antahparimarjana chikita plays a vital role in treating the *Pradhana vyadhi*(primary disease). According to *Charaka Samhita*, *upadravas* are considered as *Paratantra vyadhi* (secondary disease), therefore effective treatment of *Pradhana vyadhi* ultimately leads to the subsidence of *Paratantra vyadhi*.^[14]

Internal therapeutic measures are aimed at pacifying aggravated Doshas, correcting metabolic disturbances, and rejuvenating affected tissues.

a. Nidana Parivarjana

Nidana parivarjana is the main chikitsa of every disease.

Avoidance of causative factors such as intake of *Madhura*, *Sheeta*, *Snigdha*, *Guru*, *Abhisyandi Ahara* etc and lack of physical activities, sedentary lifestyle, and improper dietary habits.^[15]

Maintenance of proper glycaemic control through diet and lifestyle modifications.

b. Shamana Chikitsa

Therapies used to pacify *Vata Dosha* and improve nerve function:

- *Dashamoola Kashaya* – possesses anti-inflammatory and analgesic properties.
- *Mahamanjishtadi Kashaya*¹⁶ – improves microcirculation and acts as a blood purifier.
- *Ashwagandha*¹⁷ – acts as a neuroprotective and rejuvenating agent.
- *Guduchi* – helps in reducing oxidative stress and improves immunity.

c. Shodhana Chikitsa

Purificatory procedures indicated in chronic *Vata* predominant disorders:

Basti Karma – considered the prime therapy for *Vata Vyadhi* and helps in nourishment and regulation of nerve functions.

Niruha Basti with *Dashamula kwatha*

Anuvasana Basti with *Bala Taila*, *Nirgundi Taila*, *Sahacharadi Taila* or *Balaashwagandha taila Virechana* – helps in elimination of aggravated *Pitta* and metabolic toxins.

d. Rasayana Therapy

Administration of rejuvenative formulations to improve tissue strength and delay degeneration. Enhances nerve nourishment and overall vitality.

2. Bahirparimarjana Chikitsa (External Therapies)

Bahirparimarjana chikitsa plays a key role in symptomatic management especially in conditions where *upadrava* dominates the *pradhana vyadhi*. External therapies help to improve circulation, relieve pain, and restore neuromuscular function.

a. Abhyanga

Therapeutic oil massage performed using medicated oils.

Improves peripheral circulation, reduces stiffness, and alleviates numbness and pain.

b. Swedana

Sudation therapy used after *Abhyanga*.

Helps relieve muscle stiffness and improves nerve conduction.

c. Pinda Sweda^[18]

Pinda Sweda is a type of *Swedana* (sudation therapy) in which heat is applied to the body using warm boluses (potali) filled with medicinal substances. It is mainly used in aggravated Vata Dosa, stiffness, pain and neurological disorders. In Diabetic Peripheral Neuropathy (DPN), Pinda Sweda helps to relieve neurological symptoms due to its *Snigdha, Ushna, and Mridu Swedana* properties. It nourishes the nerves, improves blood circulation, reduces muscle wasting and stiffness, alleviates neuropathic pain, and enhances sensory perception.

Type of Pinda sweda	Action
Shastika Shali Pinda Sweda ^[19]	Reduces numbness, pain, burning sensation and improves sensory perception.
Patra Pinda Sweda ^[20]	Relieves pain, stiffness and burning sensation.
Churna pinda sweda ^[21]	Reduces heaviness, stiffness and improves nerve conduction.
Jambira pinda sweda	Reduces neuropathic pain, burning sensation and tenderness.
Tila pinda sweda	Reduces numbness, tingling sensation and improves sensory perception.
Kukkutanda Pinda Sweda ^[22]	Reduces pain, stiffness, muscle weakness and improves nerve nourishment.

d. Pada Abhyanga

Foot massage beneficial in reducing burning sensation, tingling, and dryness of feet.

Clinical studies which suggest that application of Prasarinyadi taila as padabhyanga helps in reducing Daha, Suptata and tingling sensation symptoms of DPN.^[23]

e. Takradhara / Shirodhara (in selected cases)

Helps reduce stress, improves sleep, and supports neurological relaxation.

CONCLUSION

In the present era, sedentary and desk-bound lifestyles have contributed significantly to the rising prevalence of Diabetes Mellitus, one of the most common metabolic disorders worldwide. Due to its chronic and progressive nature, Diabetes often leads to complications such as Diabetic Peripheral Neuropathy, which markedly impairs the quality of life of affected individuals. Therefore, there is an increasing need for effective and holistic management strategies for this condition. Ayurveda offers a comprehensive therapeutic approach through *Antahparimarjana* and *Bahirparimarjana Chikitsa*, including *Shamana, Shodhana, Abhyanga, Swedana, and Rasayana* therapies, aims not only at symptomatic relief

but also at correcting the underlying pathology and improving tissue nourishment. Among these, Shamana Chikitsa plays a major role in symptomatic management and in improving overall systemic health. *Abhyanga* helps in improving blood circulation, reduces stiffness, alleviates pain and numbness. *Swedana* contribute in relieving *Srotorodha* and enhances neuromuscular function. *Basti* being *Ardhachikitsa* serves as an important therapeutic modality in improving overall outcomes. By addressing the underlying pathological processes and promoting tissue nourishment, Ayurvedic interventions may serve as a promising supportive approach in improving the quality of life in patients with Diabetic Peripheral Neuropathy.

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