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AYURVEDIC UNDERSTANDING OF THE ETIOPATHOGENESIS OF DIABETIC PERIPHERAL NEUROPATHY

Rakesh[1], Mythrey R C[2]

1. Assistant professor, PG studies in Dept of Kayachikitsa SDM College of Ayurveda & Hosptial Hassan , PhD Scholar, Dept of Kayachikitsa, Government Ayurveda Medical College Mysuru.
2. Professor and HOD, PG & PhD studies in Dept of Kayachikitsa Government Ayurveda Medical College Mysuru

Corresponding Author: rakeshamoolya@gmail.com

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ABSTRACT

Introduction: One of the most common consequences of diabetes is diabetic neuropathy, which is frequently underdiagnosed and undertreated. Neuropathy affects approximately 50% of individuals with diabetes. Diabetes mellitus shares similarities with *Madhumeha* in terms of etiopathogenesis and symptomatology. In *Avaranjanya Madhumeha* vitiated *Pitta, Meda* and *Kapha* lead to the *Avarana* of *Vata*, exacerbating the condition and hindering the formation of essential *Dhatus*, resulting in complications such as diabetic peripheral neuropathy. Diabetic neuropathies are believed to arise from diabetic microvascular injury affecting the small blood vessels that supply nerves, in addition to macrovascular conditions that may culminate in diabetic neuropathy. Despite significant advancements in insulin and hypoglycemic medications that have benefited people with diabetes, these patients still lack adequate treatment for their neuropathic complications. Diminished perception of vibration and impairment of other modalities of sensation are the most typical indications of diabetic sensory polyneuropathy. **Materials and Method:** A review of various classical textbooks, journals and modern literature supporting the understanding of diabetic peripheral neuropathy (DPN) was conducted. **Discussion:** Symptoms of diabetic peripheral neuropathy can be identified by characteristics such as *Karapadadaha* (burning sensation), *Cumcumayana* (tingling sensation) and *Suptata* (numbness) which are observed in *Madhumeha* at any stage during the disease's *Pur-*

*varupa (*prodromal), *Rupa (*sign and symptom) or *Upadrava (*complication) stages. **Conclusion:** A review of diabetic peripheral neuropathy based on the etiopathology and symptoms of DPN in Ayurveda revealed its similarities with *Madhumeha Purvarupa*, *Lakshana* and *Upadrava*.

Keywords: Diabetes Mellitus, Diabetic Peripheral Neuropathy, *Madhumeha, Purvaroopa*

INTRODUCTION

Neuropathies are among the most prevalent long-term complications of diabetes, affecting up to 50% of patients. Distal symmetrical polyneuropathy (DSPN) is the most common form, accounting for 75% of diabetic neuropathy cases. Diabetic neuropathy (DN) is a frequently occurring disorder, defined as the signs and symptoms of peripheral nerve dysfunction in a patient with diabetes mellitus (DM), where other causes of peripheral nerve dysfunction have been excluded. Diabetic neuropathy is the most common complication of diabetes, with a prevalence of 45–50% compared to 25–30% for retinopathy and 20% for nephropathy. National or population-based studies on diabetic complications are scarce in India. Long-standing peripheral neuropathic pain associated with peripheral neuropathy occurs in one in six people with diabetes.

Recent advances in clinical evaluation and pathological studies on diabetic neuropathy revealed systematic biopsied samples of sural nerve obtained from diabetic patients with established neuropathy. These systematic studies have established that peripheral nerve pathology in diabetic patients is characterised by progressive nerve fibre loss with a pan-modal fibre size pattern. In particular, the nerve fibre degeneration is length-dependent and conspicuous in the distal portion. It has recently been shown that tiny fibres are preferentially affected in the early stages of diabetic patients, followed by the involvement of large fibres related to reduced nerve conduction velocity or decreased vibration threshold. Neuropathy can lead to sensory loss and damage to the limbs, often leading to ulceration and subsequent limb amputation.[2]

From an *Ayurvedic* perspective, the Peripheral Nervous System cannot be compared to any particular structural component. However, the *Prakruta-vikrutha karmas* off *Vatadosha* provide a sufficient explanation for both the healthy and pathological symptoms of the peripheral nerve system respectively.

It may be observed that the sensory experience of the *Panchendriyas* is significantly influenced by *Vata dosha*. This statement is supported by the explanation of *Prakruta Vata Karma, as* mentioned by the *Brhatrayees*. In its balanced and unvitiated state, *Vata* controls *chesta* or motor and reflex activities, resulting in "*Akshanaam patavam*" or intact sensory capabilities. *Vata* is *Sookshma, Swayamboo,* and *Sarvagata*. These qualities of *Vata dosha* can be compared to those of a nerve impulse. A nerve impulse is invisible, self-originating and self-propagating; *Vata dosha* functions as both a receptor and a stimulant. According to *Acharya Charaka,* without stimulation from Vata, all *dhathus, malas* and *pitta-kapha dosha* cannot carry out their functions and might be regarded as *Pangu.* Simultaneously *Vata* acts as a receptor, receiving external stimuli. A nerve impulse can serve as both a stimulator and a receptor. Efferent nerve fibres transmit impulses from the CNS to the rest of the body, stimulating the muscles to contract and glands to secrete hormones. In contrast, afferent nerve fibres convey impulses from the periphery to the CNS, acting as receptors for external stimuli such as touch, temperature, and pressure.

Aim and objective

1. Understanding the etiopathogenesis of DPN in Ayurveda
2. Understanding the pathogenesis of DPN in Ayurveda

Materials and Method

For this study, information was collected from classic and modern textbooks, journals, and PubMed articles.

Understanding of Etiopathogenesis of DPN in Ayurveda

Nidanarthakara Roga: The leading cause of the development of diabetic peripheral neuropathy is chronic diabetes mellitus or inadequate glycaemic man-

agement. Therefore, diabetic peripheral neuropathy can be considered *Madhumeha Nidanarthakara Roga*

***Prameha Nidanas*:** It includes the following *Nidana*

Table No: 1 *Prameha Roga Nidana*

Samanya pramehanidanas[4]	***Vishesha Nidana ofVataja prameha***[5]	***Vishesha Nidana of Madhumeha***[6]
Anupashaya Ahara ofprameha • *Excess use of Madhura Ahara* • *Navannapaana* • *Graamaya-oudaka-Aanoopa Mamsa,* • *Dadhi* • *Gudavaikruta*	*Aharaja nidana* • *Rasa: Kashaya,katu, tikta* • *Guna :Rooksha,laghu, sheeta* *Anya: Anashana*	*Aharaja nidana* • *Rasa – Madhura,la-vana, amla* • *Guna – Guru, Snigda* • *Anya: Navanna pana*
Anupashaya Vihara ofprameha • *Aasyasukha* • *Swapnasukha* • *Sedentary lifestyle and reduced activities Chankramanadweshaetc.)*	*Viharaja nidana* • *Ativyayama* • *Ativyavaya* • *Vamana, Virechana, Asthapana shirovirechana atiupayoga* • *Vegasandharana* • *Abhighata* • *Atapasevana* • *Shonitatiseka* • *Ratrijagarana,Vishama shareerasana*	*Viharaja nidana* • *Achintya* • *Avyayama* • *Asya sukha* • *Atinidra* • *Asamshodhita*
Manasika nidanas • *Udvega* • *Shoka*	*Manasika nidanas* • *Udvega* • *Atishoka*	

Rupa

In different contexts, significant symptoms and signs associated with DPN are identified in Ayurvedic classics.

Table No. 3: Showing the symptoms and signs associated with DPN are identified in Ayurvedic classicsin different contexts

Symptoms	Lakshanas	Context/reference
Numbness	*Supti*	*Vataja nanatmaja vyadhi*[7] *Padaharsha* [8]
	Swapa	*Twakgata vata*[9] *Vyanavruta prana*[10] *Kapha samsruthsa vatarakta*[11]
Burning sensation	*Daha* *Vidaha*	*Rakthavrita vata*[12] *Prameha purvarupa*[13] *Prameha upadrava*[14] *Padadaha* [15]

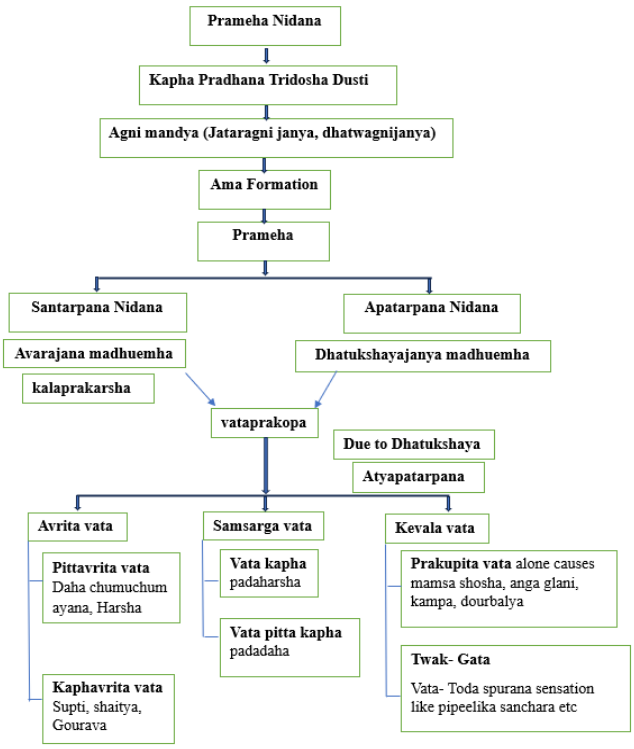
	Paridoopana *Santapa*	*Pittaja nanatmaja vikara*[16] *Twakgata vata* *Pittavruta vata* [17] *Pittavrita prana* [18] *Pittavritaudana*[19] *Pittavrita samana*[20]
Heaviness of limbs	*Guruta*	*Kaphavrita vata*[21]
Hyperalgesia	*Soochivat toda*	*Majjavrita vata*[22]
Tingling sensation	*Chumuchumayana* *Harsha* *Pipeelika sanchara* *Sphurana*	*Vatapradhana vatarakta* *Mamsavrita vata*[23] *Prameha purvarupa* *Twakgata vata*
Abnormal pain perception	*Toda* *Shoola* *Bheda*	*Vatapradhana vatarakta* *Padavata* [24] *Vataja nanatmaja vikara*
Weaknesses of extremities	*Dourbalya* *Anga klama* *Cheshta sanga*	*Prameha upadrava* *Pittavrita vyana*[25]
Involuntary movements	*Kampa*	*Prameha upadrava* *Supti vata*[26]

Understanding the pathogenesis of DPN in Ayurveda

A *vyadhi* undergoes *vata prakopa* gradually as it progresses from *Nava* to *Purana Avastha.* If they are not treated, all forms of *Prameha* eventually lead to *madhumeha*, a *vataja Prameha*.[27] Regardless of the *Samprapthi*, *Madhumeha* can be either *Shudha vatajanya* or *Avaranajanya,* but result in additional *vata prakopa*.

Avaranajanya madhumeha: *Santarpana Nidanas* causes *Vridhi* of *Pitta*, *Kapha*, *Medas* and *Mamsa*. This obstructs the *gati* of *Vata,* resulting in *Vata Prakopa*. *Madhumeha* develops when *Prakupita Vata* pulls *Ojas* and other *Kleda Dravyas* toward the *Basti*.[28] When *Avarana samprapti* continues for a more extended period, it will attain *Dhatukshaya avasta,* and *Dhatukshayaja samprapti* will continue in further stages of the disease process

***Dhathukshayajanya samprapti*:** Because of *Apatarpana Nidanas, Prakupita Vata* causes *Dhathukshaya* and directs *Ojas* towards the *Basti pradesha* when *Vata* is in *Prakupita avasta*, and *Pitta* and *Kapha* are comparatively reduced (because of *taratama bhava*)[29] This type of *Tara Tama bhava* also causes a series of changes with the further aggravation of *Vata dosha* and *Kshaya* of *dhatus.* Aggravated *Vata* causes the elimination of *Dhatus* through the passage of *Basti* (bladder) and results in *Dhatukshaya*. *Prakupita Vata* and *Dhatukshayaja avasta* results in manifestation of symptoms such as *Daha*(burning sensation), *Swapa* (numbness), *Harsha* (tingling sensation), *Shoola* (Pain), *Mamsa shosha* (wasting), *Anga glani* (malaise), *stambha* (stiffness), *Kampa* (involuntary movements), *Dourbalya* (weakness) and all other symptoms of *Dhatu kshaya* which are the *Upadrava avastha* (complication stage) of *Madhumeha*. These symptoms are attributed to Diabetic Peripheral Neuropathy.



DISCUSSION

From an *Ayurvedic* perspective, the Peripheral Nervous System cannot be compared to any specific structural component. However, the *Prakruta-vikrutha karmas* of *Vatadosha* provide a sufficient explanation for the healthy and pathological symptoms of the peripheral nervous system—*Vata dosha* functions as both a receptor and a stimulant. According to *Acharya Charaka* without *Vata's* stimulation, all *dhathus, malas* and *pitta-kapha dosha* are incapable of performing their functions and may be regarded as *pangu*. Simultaneously, *vata* acts as a receptor, receiving external stimuli. A nerve impulse can serve as both a stimulator and a receptor. Efferent nerve fibres transmitting impulses from the CNS to the rest of the body stimulate muscles to contract and glands to secrete hormones, while afferent nerve fibres conveying impulses from the periphery to the CNS act as receptors for external stimuli such as touch, temperature, and pressure. When discussing the *nidana* of *prameha*, excessive intake of *Madhura* rasa (sweet taste) causes *Kapha dosha prakopa, Agnimandya,* and *Amotpatti,* which further leads to the *Dushti* of *Rasa* and *Medo dhatu* due to their similar qualities. *Pitta prakopa, Rakta dushti,* and *Shitilatha* of *dhatus* are provoked by excessive consumption of *Amla rasa* (sour taste). The body experiences increased *Kledatva* when *Lavana rasa* (salt taste) is consumed excessively. Similarly *gunas* (qualities) such as *Guru* (heavy), *Snigda* (unctuous) and *Picchila* (slimy) cause *Kapha dosha prakopa*, which also leads to *Rakta* and *Medo dhatu dushti*. Ultimately, the *Viharaja nidanas* listed in the *Prameha nidanas* will result in *Kapha Prakopa* and impact *Medo Dhatu* regarding *Santarpana*. Therefore, an individual who overindulges in these *Nidanas* will result in the vitiation of *Kapha, Pitta, Rasa, Rakta, and Medo dhatus*. In discussing the *nidanas* of *Madhumeha*, both *aharaja* and *viharaja* contribute to the *prakopa* of Vata dosha and are *Apatarpaka* in nature. *Vata prakopaka* and *apatarpana nidanas* will cause Dhatu *kshaya;* hence, the *upadrava* of *madhumeha*, namely DPN, will manifest. The clinical characteristics of DPN are addressed under *poorvarupa* and *upadrava* of *Prameha Roga.*

CONCLUSION

Diabetic Peripheral neuropathy is a complex multi-factorial disorder with varied clinical features. It cannot be directly correlated to any predefined condition in Ayurveda. However, based on *Nidana, Dosha Dushya sammurchana, and Lakshana*, one can plan the treatment and improve the condition of diabetic peripheral neuropathy.

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