

AYURVEDIC UNDERSTANDING OF PATHOGENESIS OF DIABETIC PERIPHERAL NEUROPATHY

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ABSTRACT

Introduction: Diabetic Peripheral Neuropathy is a common complication of diabetes mellitus, characterized by damage to the peripheral nerves due to chronic hyperglycemia, leading to sensory, motor, and autonomic dysfunction, primarily in the distal extremities.^[1]

Objectives: understanding the Ayurvedic perspective diabetic peripheral neuropathy. **Material and methodology:** diabetic peripheral neuropathy can be taken under madhumeha upadrava and purvarupa, avara janya vata, vatarakta, vatavyadhi, jwara and pandu. **Conclusion:** We believe that Ayurveda has a solution to this problem. In this review, we provide an understanding of diabetic peripheral neuropathy using the Ayurveda concept of what all pathological events involves in madhumeha upadrava to cause daha, chimichimayana, suchivat toda, supti and dourbalya.

KEYWORDS: madhumeha upadrava, diabetic peripheral neuropathy, metabolic pathway, polyol pathway, vascular insufficiency, mitochondrial dysfunction, demyelination, axonopathy, different avaranas.

INTRODUCTION

Diabetic Peripheral Neuropathy (DPN) is a prevalent complication of diabetes mellitus, affecting approximately 50% of diabetic individuals during their lifetime.^[4] It is characterized by damage to peripheral nerves due to prolonged hyperglycemia, leading to symptoms such as numbness, tingling, and pain, predominantly in the lower extremities.^[5] DPN is the most

common form of diabetic neuropathy and a leading cause of lower limb amputations in Western countries.

The pathogenesis of DPN involves complex mechanisms, including microvascular injury, oxidative stress, and the accumulation of advanced glycation end products, which contribute to nerve damage and functional impairment.^[7] Early detection and management of DPN are crucial to prevent severe complications, emphasizing the need for regular screening and comprehensive diabetic care.

The symptomology corresponding to the clinical presentation of dpn is scattered in purvarupa, lakshana, upadrava of prameha, madhumeha upadrava, vatarakta and vatavyadhi, pandu, jwara. acc to asthanga hrudaya, acharya vagbhata clearly mentioned daha as pittaja madhumeha upadra, supti as kaphaja, shosha as vataja madhumeha upadrava.

MATERIALS AND METHODS

Diabetic peripheral neuropathy Pathogenesis

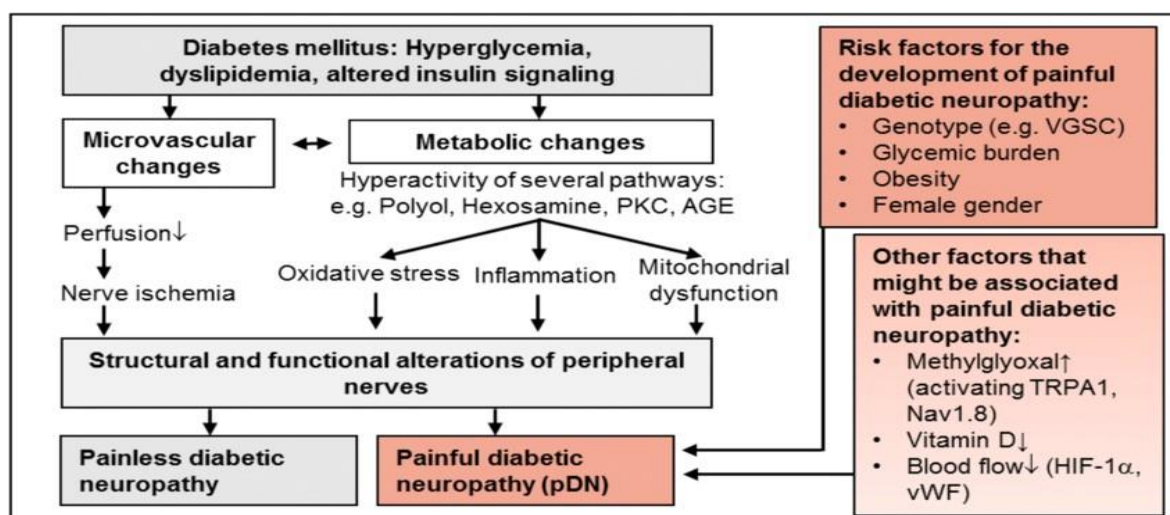
It mainly involves Metabolic Pathways and vascular insufficiency which leads finally into demyelination or axanopathy.

Metabolic pathway: through Polyol Pathway Activation, excess glucose is converted to sorbitol via aldose reductase. Sorbitol is then oxidized to fructose. Accumulation of sorbitol and fructose within nerve cells leads to osmotic stress and reduced levels of essential cofactors like NADPH, impairing nerve function.^[9] By Advanced Glycation End Products (AGEs), Chronic high blood sugar results in the formation of AGEs through non-enzymatic glycation of proteins and lipids. AGEs disrupt normal cellular functions and promote oxidative stress and inflammation, contributing to nerve damage.^[10] by Oxidative Stress Hyperglycemia increases the production of reactive oxygen species (ROS), overwhelming the antioxidant defense mechanisms. Elevated ROS levels cause direct neuronal injury and damage to the microvasculature supplying peripheral nerves.^[11]

Vascular Insufficiency: Diabetes-induced microvascular changes, such as capillary basement membrane thickening and endothelial hyperplasia, lead to reduced blood flow and oxygen supply (ischemia) to peripheral nerves. This ischemia exacerbates nerve injury and impairs nerve repair mechanisms.^[12] Chronic inflammation in diabetes involves the activation of pro-inflammatory pathways and cytokines, which can induce nerve damage through

metabolic and cellular pathways. This inflammatory milieu contributes to the progression of DPN.^[13]

Mitochondrial Dysfunction: Hyperglycemia-induced mitochondrial dysfunction leads to impaired energy production and increased oxidative stress within nerve cells, further contributing to neuronal damage and the development of neuropathy.^[14]



Ayurveda perspective of diabetic periphera neuropathy

In madhumeha upadrava, Maily avarana and dhatukshayaja samprapti is involved. either pittavruta or kaphavruta vata gets hindrance in its prakruta vata gati or karma leading to symptoms like supti, daha, chimichimayana, suchivat toda and dourbalya.

Pathological events involved to cause DPN symptoms are.

Supti involves vataja nanatmaka vikara,^[15] prameha poorvarupa,^[16] rakavruta vata,^[17] vyanavruta prana,^[18] meda kaphavruta vata^[19] and vatavyadhi samanya laxana.^[20]

Daha having pathogenesis as in prameha purva rupa,^[21] prameha upadrava,^[22] raktavruta vata,^[23] pittaja nantmaja vikara,^[24] pittavruta vata,^[25] pittavruta prana,^[26] pittavruta udana,^[27] pittavruta samana,^[28] and pittavruta vyana.^[29]

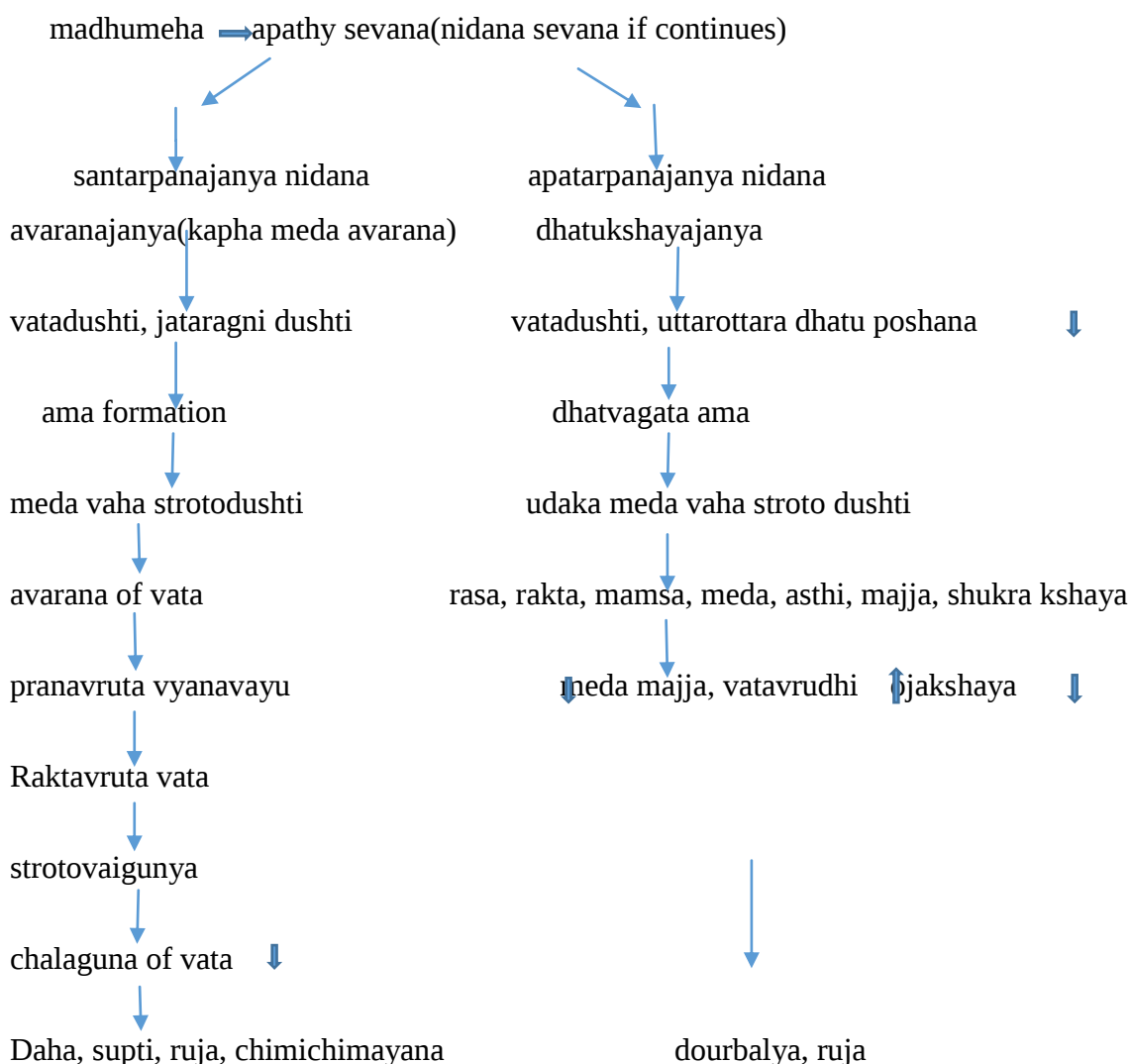
Suchivat toda involves raktavruta vata^[30] and majjavruta vata.^[31]

Chimichimayana involves pittavruta samana,^[32] mamsavruta vata,^[33] kaphavruta udana^[34] and kaphavruta samana.^[35]

Shula involves vataja prameha upadrava,^[36] pittavrita vata^[37] and vataja nanatmaja vikara.^[38]

Dourbalya involves in prameha upadrava.^[39]

Madhumeha upadrava samprapti(diabetic peripheral neuropathy)



Sampraptighataka

Dosha: vata pradhana tridosha.

Dushya: rasa, rakta, mamsa, medas, majja, shukra, shareera kleda, lasika, vasa, ojas, sira, kandara and snayu in later stages.

Agni: jatharagni and dhatwagni.

Agni dushti: jataragni and dhatwagni (rasa, meda, mamsa, majja) mandyajanya

Ama: jataragnijanya, dhatvagnijanya

Srotas: mamsavaha, medovaha, mootravaha, vatavaha

Srotodushti prakara: sanga, vimargagamana

Udbhavasthana: amapakwashaya

Sancharasthana: sarvashareera

Vyaktasthana: shakha

Adhishthana: sarva shareera

Rogamarga: bahya, abhyantara

Vyadhi swarupa: chirakari.

Vyavachedakanidana: vatavyadhi, prameha, vatarakta, sthoulya, vvisa, madhya, daha, chikitsa vaishamya.

DISCUSSION

In madhumeha, due to various nidana Vata pradhana tridosha vitiation takes place, hence two types of samprapti manifests in Madhumeha. They are Avarana and dhatu kshaya. Madhumeha upadrava (DPN), have avaranajanya and dhatukshayajanya samprapti. samprapti begins with santarpana and apatarpana janya ahara, vihara, and manasika nidanas. in santarpana janya nidanas, jataragni dushti-causes ama, vitiating rasa which vitiates kapha and meda, which further vitiates rasa, rakta, mamsa, majja, meda, shukra, oja, vasa, ambu, lasika, impacting on dhatugata ama, srotovaigunya and medovaha strotodushti, then leading to pranavruuta vyana, raktavrita vata pathology, causing decrease in chala guna of vyana vata, srotovaigunya (structural damage) at peripheral blood supply (siras) causes madhumeha upadrava lakshanas (chumchumayana, supti, suchivat toda, dourbalya, daha)

The types are - Pittavrita Vata, Kaphavrita vata, Shonitavrita Vata, Mamsavrita Vata and other types of dhatu avrata Vata.

When Avarana samprapti continued for longer period it will attain dhatukshaya avasta. Dhatukshaya further leads to vata prakopa, resulting into continuation of disease process.

By apatarpana nidanas, vatavrudhi leads to decrease in uttarottara dhatu poshana, ama formation, leading to vitiation of udaka, meda vaha strotas, specially majja, oja, meda kshaya and vatavrudhi leading to madhumeha upadrava lakshanas dourbalya, ruja, mamsa shosha, anga glani, stambha, kampa, dourbalya.

increased vata draws lasika, majja, rasa, oja to basti so lasika means liquid component present just beneath skin, excreted from the skin in the form of sweat which can cause daha.

CONCLUSION

Diabetic peripheral neuropathy can be taken either under avarajanya or dhatukshayajanya samprapti. affecting Dosha, dhatu and oja along with stroto vaigunya. by understanding about samprapti one can go for samprapti vighatana chikitsa, shamanoushadhi and rasayana.

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