IAMJ

INTERNATIONAL AYURVEDIC MEDICAL JOURNAL

Review Article ISSN: 2320-5091 Impact Factor: 6.719

UNDERSTANDING THE ROLE OF PACINIAN AND MEISSNER CORPUSCLES IN DIABETIC NEUROPATHY: AN AYURVEDIC PERSPECTIVE

Ankit Kumar[1], Meha Gandhi[2]

[1]Assistant Professor, Department of Kayachikitsa, National College of Ayurveda and Hospital, Hisar Haryana
[2]PG scholar, Department of PG studies in Kayachikitsa, Parul Institute of Ayurved, Vadodara, Gujarat

Corresponding Author: dr.ankitks95@gmail.com

https://doi.org/10.46607/iamj2613032025

(Published Online: March 2025)

Article Received: 06/02/2025 - **Peer Reviewed:** 27/02/2025 - **Accepted for Publication:** 08/03/2025.

ABSTRACT

Introduction: Diabetic neuropathy (DN) is a progressive neurodegenerative disorder primarily affecting mechanoreceptors such as Pacinian and Meissner corpuscles, leading to impaired tactile perception and sensory deficits. While Biothesiometry is widely used to quantify vibratory perception threshold (VPT) alterations, its correlation with Ayurvedic neurophysiology, particularly Sparshanendriya dysfunction and Majja-Kshaya, remains unexplored. Bridging this gap could enable a more integrative diagnostic and therapeutic model for DN management. Objective: This study aims to establish a conceptual framework correlating Ayurvedic principles of Vata Vyadhi and mechanoreceptor dysfunction in DN while exploring the potential of Ayurvedic interventions in mechanoreceptor regeneration. Methods: A three-tiered methodology was adopted: (i) Ayurvedic textual analysis of Sparshanendriya, Vata Vyadhi, and Majjavaha Srotas Dushti; (ii) modern neurophysiological review on mechanoreceptor impairment in DN, including VPT alterations; (iii) integrative analysis, mapping mechanoreceptor dysfunction with Ayurvedic pathology and exploring Biothesiometry as a functional assessment tool. Results & Research Gaps: A strong theoretical correlation was found between Pacinian/Meissner corpuscle dysfunction and Sparshanendriya deficits in DN. However, Ayurvedic diagnostics lack objective validation through modern assessment tools. Additionally, while therapies like Basti, Rasayana, and Snehana show promise, controlled clinical trials measuring their impact on VPT and NCV parameters are needed. Conclusion: Integrating Ayurvedic diagnostics with Biothesiometry can standardise DN assessment, and future interdisciplinary research is essential to

validate Ayurvedic therapies with objective neurophysiological evidence. This study paves the way for an evidence-based, integrative approach to diabetic neuropathy management.

Keywords: Diabetic neuropathy, Pacinian corpuscles, Meissner corpuscles, Sparshanendriya, Vata Vyadhi, Majja-Kshaya, Biothesiometry, Vibratory Perception Threshold (VPT), Ayurvedic neurophysiology, Mechanoreceptor dysfunction, Medovaha Srotas, Majjavaha Srotas, Ayurvedic diagnostics.

INTRODUCTION

Diabetic neuropathy (DN) is one of the most prevalent and debilitating complications of Diabetes Mellitus (DM), affecting nearly 50% of diabetic patients worldwide[1]. Characterised by progressive sensory deficits, neuropathic pain, and autonomic dysfunction, DN significantly impairs the quality-of-life[2]. Among its early manifestations, mechanoreceptor dysfunction—specifically the impairment of Pacinian corpuscles (PCs) and Meissner corpuscles (MCs)—plays a crucial role in the loss of vibratory and tactile sensation yet remains an underexplored area in clinical and translational research[3]. Despite extensive literature on diabetic polyneuropathy, limited studies have specifically correlated mechanoreceptor degeneration with disease progression, creating a critical gap in both early diagnosis and targeted therapeutics[4].

Modern neurophysiology classifies PCs as rapidly adapting mechanoreceptors responsible for vibration perception, whereas MCs mediate fine touch sensation[5]. Histopathological and neuroimaging studies have demonstrated a marked reduction in MC density in diabetic patients, correlating with sensory deficits[6]. Similarly, PCs exhibit axonal degeneration, disrupted lamellar organisation, and Schwann cell alterations, leading to impaired vibratory perception[7]. However, current diagnostic approaches predominantly rely on electrophysiological studies (e.g., nerve conduction studies and electromyography), which fail to assess cutaneous mechanoreceptor function directly[8]. Biothesiometry, a non-invasive tool for assessing vibratory perception thresholds (VPTs), holds significant potential in quantifying mechanoreceptor dysfunction, yet remains underutilised in routine diabetic neuropathy screening[9].

From an Ayurvedic perspective, tactile perception (Sparshanendriya) is governed by Vata Dosha, particularly Vyana Vata, responsible for sensory and motor coordination[10]. The Charaka Samhita explicitly states that Sparshana (tactile perception) and neural transmission are integral functions of Vata, and any Vata Dushti (functional impairment) manifests as sensory disturbances, including Suptata (numbness), Toda (pricking pain), and Daha (burning sensation) **[11]. The Sushruta Samhita describes Dhamani Pratichaya (vascular insufficiency) and Sira Snayu Daurbalya (degeneration of nerves and ligaments) as pathological factors contributing to neuropathic conditions[12]. Despite these detailed descriptions, there is a lack of research correlating Ayurvedic pathophysiology with mechanoreceptor degeneration in DN, representing a major research gap.

Furthermore, Ayurvedic interventions, such as Rasayana therapy (nerve rejuvenation), Panchakarma procedures (e.g., Abhyanga, Basti), and neuroprotective formulations (e.g., Vajra Guggulu, Brahmi, and Ashwagandha), have shown promising results in nerve regeneration and microvascular repair[13]. However, objective assessments of their efficacy using modern tools like biothesiometry and mechanoreceptor density analysis are lacking, thereby limiting their clinical validation in DN treatment[14]. Bridging this gap through an integrative model that combines Ayurvedic therapeutic principles with modern mechanoreceptor assessments could pave the way for novel diagnostic and therapeutic strategies in DN management.

Research Gap & Study Rationale

1. Limited research on mechanoreceptor degeneration in DN – While diabetic neuropathy is exten-

sively studied, Pacinian and Meissner corpuscles' dysfunction remains largely underexplored.
2. Absence of mechanoreceptor-specific diagnostic protocols – Current diagnostic tools (e.g., nerve conduction studies) assess large fibre function but fail to quantify cutaneous mechanoreceptor impairment.
3. Lack of correlation between Ayurvedic pathophysiology and mechanoreceptor dysfunction – Although Vata Vyadhi in Ayurveda describes sensory deficits similar to DN, no studies have objectively correlated mechanoreceptor dysfunction with Ayurvedic pathophysiology.
4. Unvalidated efficacy of Ayurvedic neuroprotective interventions – Despite Ayurvedic formulations being used for neuropathic conditions, no studies have evaluated their effect on mechanoreceptors through biothesiometry and modern neuroimaging.

This study aims to address these critical gaps by correlating modern neurophysiological insights into mechanoreceptor degeneration with Ayurvedic concepts of Vata Dushti and by exploring the role of Ayurvedic interventions in mechanoreceptor preservation and functional restoration. By integrating biothesiometry with Ayurvedic diagnostic paradigms, this research proposes a novel framework for early detection, pathophysiological understanding, and therapeutic innovation in diabetic neuropathy.

MATERIALS AND METHODS

1. Study Design

This study employs a conceptual, analytical, and interdisciplinary approach to establish a correlation between Pacinian and Meissner corpuscle dysfunction in diabetic neuropathy and Ayurvedic pathophysiology (Vata Vyadhi, Sparshanendriya Dushti, and Majja-Kshaya).

A three-pronged methodology was adopted:

1. Ayurvedic Classical Literature Review—This Section extracts and interprets Sparshanendriya (tactile perception) concepts and their mechanistic correlation with Pacinian and Meissner corpuscle dysfunction.
2. Modern Neurophysiological Review—A systematic analysis of peer-reviewed neurophysiological studies on mechanoreceptor impairment in diabetic neuropathy, sourced from PubMed, Scopus, and Web of Science.
3. Integrative Analytical Framework – Development of a standardised diagnostic and therapeutic bridge between Ayurvedic sensory dysfunction assessment and modern mechanoreceptor pathology.

This methodology bridges the knowledge gap between Ayurvedic and modern neurological paradigms.

2. Literature Review and Conceptual Analysis

2.1 Ayurvedic Literature Analysis

A systematic textual review of Charaka Samhita, Sushruta Samhita, Ashtanga Hridaya, and Madhava Nidana was conducted to extract classical insights on Sparshanendriya, Vata Vyadhi, and Majja-Kshaya.

Key Ayurvedic Pathophysiological Concepts

- **Sparshanendriya (Tactile Perception) & Vata Vyadhi:**
  - The Sparshanendriya (sensory perception of touch) is governed by Vayu, enabling tactile stimuli transmission through Tvak (skin) and Snayu (nerves)[15].
  - Sushruta Samhita classifies Sparshanendriya Dushti as a primary dysfunction in Vata Vyadhi, marked by loss of fine touch (Meissner corpuscles) and vibration perception (Pacinian corpuscles) [16].
  - In Diabetic Neuropathy, this dysfunction aligns with Vata Prakopa, leading to Sukshma Snayu Daurbalya (small nerve fibre degeneration) [17].
- **Medovaha & Majjavaha Srotas Dushti (Srotodushti in Neuropathy):**
  - The Medovaha Srotas regulates metabolic functions and lipid homeostasis, whereas the Majjavaha Srotas governs neurophysiological functions[18].
  - Chronic Kapha-Medo Dushti (lipid toxicity in diabetes) leads to Srotorodha (microvascular ob-

struction), impairing mechanoreceptor nutrition[19].

- Progressive Majja-Kshaya (degeneration of the myelin sheath and neural structures) directly correlates with sensory nerve impairment in diabetic neuropathy[20].

- **Nidana Panchaka (Etiopathogenesis) of Vata Vyadhi:**
- Samprapti (Pathogenesis) of Diabetic Neuropathy in Ayurveda is linked to:
- Dhatukshaya (degeneration of nerve fibers)
- **Avarana (microvascular obstruction affecting nerve function) [21]
- Vata-Kapha Prakopa (leading to hypoxia-induced nerve degeneration) [22].
- Chikitsa Siddhanta (Therapeutic Principles):
- Snehana & Rasayana Therapy (Neuroprotective regeneration)
- Basti Karma (Restoring Majja and Vata homeostasis)
- Lekhana Chikitsa (Addressing Medovaha Dushti)
- These therapeutic approaches have parallels with neuroprotective and regenerative interventions in modern medicine[23].

2.2 Modern Neurophysiological Review

A systematic review of scientific literature (PubMed, Scopus, Web of Science) was conducted to assess:

- Structural and functional degeneration of Pacinian and Meissner corpuscles in diabetic neuropathy.
- Biothesiometry and OK touch testing as diagnostic tools for mechanoreceptor dysfunction.
- Neuroprotective strategies for sensory nerve regeneration.

This analysis bridges modern mechanoreceptor pathology with Ayurvedic neurophysiology, allowing for a standardised integrative approach.

2.3. Biothesiometry as a Functional Assessment Tool

To establish a measurable link between Ayurvedic sensory dysfunction assessment and modern diagnostics, Vibratory Perception Threshold (VPT) analysis via biothesiometry was explored as a functional surrogate for mechanoreceptor degeneration[24].

- Pacinian Corpuscles Dysfunction → Assessed using VPT values (>25V indicating severe dysfunction) [25].
- Meissner Corpuscles Dysfunction → This is correlated with acceptable touch loss and higher VPT values.
- 6-point plantar VPT assessment → Evaluated mechanoreceptor degeneration across multiple anatomical locations[26].

This objective, Ayurveda-compatible diagnostic method validates the Sparshanendriya dysfunction assessment and standardises a comparative framework.

2.4. Ayurvedic Pathophysiological Correlation Model

A novel integrative model was developed to classify mechanoreceptor impairment in diabetic neuropathy through an Ayurvedic lens.

- Dashavidha Pariksha (Tenfold Examination) → Applied to analyse Vikriti, focusing on Majja Kshaya and Vata Prakopa[27].
- Srotas Pariksha (Examination of Body Channels) →
- Medovaha Srotas (metabolic impairment) → Linked to diabetic microangiopathy affecting nerve nutrition.
- Majjavaha Srotas (neurophysiological integrity) → Correlated with mechanoreceptor degeneration[28].
- Sparshanendriya Pareeksha (Ayurvedic Sensory Evaluation) → Correlated with VPT values to standardise diagnostic accuracy.

2.5. Ayurvedic Therapeutic Considerations for Mechanoreceptor Preservation

A therapeutic analysis was conducted to evaluate Ayurvedic interventions for mechanoreceptor regeneration and sensory nerve protection:

- Neuroprotective Rasayana (e.g., Brahmi, Ashwagandha) → Role in mechanoreceptor preservation.

- Panchakarma interventions (Basti, Nasya, Abhyanga) → Evaluated for microvascular and neuroregenerative potential.
- Herbo-mineral formulations (e.g., Vajra Guggulu, Rasayana Churna) → Potential impact on sensory nerve health.

This bridges Ayurvedic neurotherapy with mechanoreceptor pathophysiology, forming an evidence-based integrative model.

This methodology establishes a scientifically rigorous framework for integrating Ayurvedic and modern neurophysiological perspectives on mechanoreceptor dysfunction in diabetic neuropathy. By standardising assessment via biothesiometry and Ayurvedic sensory diagnostics, this study proposes a clinically relevant, evidence-based approach for future integrative research.

DISCUSSION

Diabetic neuropathy is a progressive disorder characterised by sensory dysfunction due to mechanoreceptor impairment, particularly affecting Pacinian and Meissner corpuscles. In Ayurveda, such sensory disturbances align with Sparshanendriya Dushti, primarily governed by Vata Dosha and associated with Majja-Kshaya, Medovaha Srotodushti, and Vata-Vyadhi pathogenesis. This discussion aims to bridge Ayurvedic insights with modern neurophysiology, offering a holistic perspective on mechanoreceptor dysfunction in diabetic neuropathy.

1. Pathophysiology of Mechanoreceptor Dysfunction: Ayurvedic vs. Modern Correlation

Diabetic neuropathy results from chronic hyperglycemia, which leads to oxidative stress, ischemia, metabolic dysregulation, and progressive neurodegeneration. Mechanoreceptor dysfunction primarily affects Pacinian and Meissner corpuscles, both responsible for sensory perception, particularly vibration and fine touch sensation.

In Ayurveda, these changes align with Vata-Vyadhi (neuropathic disorders) due to Vata Prakopa (excessive Vata aggravation), which results in Majja-Kshaya (neurodegeneration) and Srotodushti (pathological blockage of neural pathways).

Table 1: Structural and Functional Impairment of Mechanoreceptors in Diabetic Neuropathy

Mechanoreceptor	Function in Normal Physiology	Pathological Changes in Diabetic Neuropathy	Ayurvedic Correlation
Meissner Corpuscles	Detects light touch and fine tactile sensations in glabrous (hairless) skin	↓ Decreased density and atrophy → Loss of fine touch sensation	*Sparshanendriya Dushti* (Impaired tactile sensation)
Pacinian Corpuscles	Detects vibration and pressure changes located deep in the dermis	↓ Reduced mechanoreceptor function → Impaired vibratory perception (↑ VPT threshold)	*Majja Kshaya & Medovaha Srotodushti* (Neurodegeneration and lipid pathway damage)

2. Biochemical and Molecular Pathways: Ayurvedic Perspective

The progressive mechanoreceptor dysfunction in diabetic neuropathy involves multiple biochemical and molecular changes, which align with Ayurvedic concepts of Vata-Vyadhi, Dhatu-Kshaya, and Srotodushti.

Table 2: Biochemical and Molecular Pathways: Ayurvedic Perspective

Modern Biochemical Pathways	Ayurvedic Interpretation	Functional Consequences
Chronic Hyperglycemia → Accumulation of Advanced Glycation End Products (AGEs)	Madhumeha leading to Ojakshaya (Vitality depletion)	Structural damage to Meissner & Pacinian corpuscles
Oxidative Stress → ↑ Reactive Oxygen Species (ROS)	Vata Prakopa leading to Dhatukshaya (Tissue depletion)	Axonal degeneration, reduced sensory function

Endothelial Dysfunction → ↓ Nitric Oxide, Microvascular Ischemia	Raktavaha Srotodushti leading to Majja-Kshaya	Ischemic damage to mechanoreceptors
Neurotrophic Factor Deficiency → ↓ NGF, BDNF	Imbalance in Meda-Majja Dhatu	Loss of sensory nerve regeneration capacity

- **Clinical Significance**: Ayurvedic therapies targeting Ojakshaya reversal, Raktavaha Srotas detoxification, and Vata pacification could theoretically reverse mechanoreceptor dysfunction.

3. Ayurvedic Diagnosis and Modern Functional Assessment

Since diabetic neuropathy is progressive, early detection of mechanoreceptor dysfunction can significantly improve clinical outcomes. Ayurveda provides Sparshanendriya Pareeksha (tactile sensory assessment) and Dashavidha Pareeksha (tenfold examination), which can be correlated with modern functional assessments like Biothesiometry and Quantitative Sensory Testing (QST).

Table 3: Ayurvedic Examination Methods for Sensory Dysfunction

Ayurvedic Diagnostic Method	Description	Modern Equivalent
Sparshanendriya Pareeksha (Touch Sensory Assessment)	Evaluates tactile perception using fine touch discrimination	Monofilament Testing, Tactile Pressure Testing
Vikriti Pareeksha (Assessment of Dosha-Vikriti)	Determines Vata-Vyadhi severity based on sensory dysfunction	Neuropathy Grading Scales (DNS Score, MNSI Score)
Srotas Pariksha (Examination of Majjavaha & Medovaha Srotas)	Evaluates Neural & Lipid metabolic dysfunction	Lipid Profile, Nerve Conduction Studies
Prakriti-Vikriti Assessment	Identifies high-risk individuals based on Vata-Pitta dominance	Genetic Risk Screening for Neuropathy

- **Clinical Significance**: Ayurvedic assessment methods provide **functional diagnostics**, which **complement modern tools** for neuropathy screening.

4. Biothesiometry as an Ayurvedic Diagnostic Tool

Biothesiometry measures the Vibratory Perception Threshold (VPT), which can be integrated into Ayurvedic diagnostic frameworks to assess Vata-Vyadhi severity.

Table 4: Ayurvedic Interpretation of Biothesiometry VPT Values

VPT Score (Volts)	Neuropathy Severity	Ayurvedic Correlation
0-15 V	Normal Sensory Function	Prakrita (Normal Vata balance)
16-20 V	Mild Neuropathy	Vata-Prakopa (Early Sensory Dysfunction)
21-25 V	Moderate Neuropathy	Majja-Kshaya & Medovaha Srotodushti
> 25 V	Severe Neuropathy	Dhatukshaya & Srotodushti leading to irreversible Vata-Vyadhi

- **Clinical Relevance**:
  - High VPT correlates with Majja-Kshaya & Medovaha Srotodushti, indicating advanced neurodegeneration.
  - Integrating Biothesiometry with Ayurvedic assessment can enhance early diagnosis and preventive interventions.

Research Gaps & Future Directions

Despite the compelling theoretical convergence of Ayurvedic neurophysiology and modern mechanoreceptor pathology, significant research gaps hinder the clinical integration of Ayurveda with objective neurosensory assessments like Biothesiometry. Bridging these gaps could redefine the management of diabetic

neuropathy, offering a holistic yet scientifically validated approach.

Integrating Biothesiometry with Ayurvedic Diagnosis: The Unexplored Domain

While Biothesiometry provides a precise, reproducible measure of vibratory perception thresholds (VPTs), there is no established framework correlating these findings with Ayurvedic diagnostic principles such as Sparshanendriya Pareeksha (Tactile Sensory Evaluation) and Majja-Kshaya assessment. Sparshanendriya Pareeksha (Tactile Sensory Assessment) could be used to classify Vata Prakopa severity in early neuropathic changes. Majja-Kshaya & Medovaha Srotodushti could correlate with high VPT scores, indicating mechanoreceptor degeneration. A standardised Ayurvedic-Biothesiometry assessment model could enable early neuropathy detection before irreversible nerve damage occurs. Developing a Biothesiometry-based Ayurvedic classification for diabetic neuropathy, correlating VPT scores with Vata-Vyadhi severity and establishing a diagnostic protocol integrating Ashtavidha Pareeksha (Eightfold Ayurvedic Examination) with modern mechanoreceptor testing.

Clinical Impact: Ayurveda-based sensory diagnostics could be scientifically validated, enhancing early neuropathy detection and patient stratification.

Ayurvedic Therapies & Mechanoreceptor Regeneration: The Need for Controlled Trials

Although Ayurvedic therapeutics like Basti (medicated enema), Rasayana (rejuvenation therapy), and Snehana (oleation therapy) are traditionally prescribed for Vata disorders affecting the nervous system, there is no robust clinical trial data quantifying their impact on mechanoreceptor function using VPT or Nerve Conduction Velocity (NCV) measurements. Basti (Neuroprotective Medicated Enema): Promotes Majja-Dhatu nourishment, potentially restoring Pacinian corpuscle function. Rasayana Therapy (Neuroregeneration): Enhances Ojas & metabolic integrity, possibly aiding Meissner corpuscle recovery. Snehana (Lipid-Based Nervine Therapy): Could counteract lipid peroxidation & neurodegeneration, improving mechanoreceptor integrity. Randomised controlled trials (RCTs) using VPT & NCV as primary outcome measures for evaluating Basti, Rasayana, and Snehana therapy in diabetic neuropathy. Advanced imaging studies (High-resolution ultrasound of mechanoreceptors) pre- and post-Ayurvedic therapy to track structural regeneration.

- Clinical Impact: These trials could scientifically establish Ayurveda as a mechanoreceptor-targeted therapy, paving the way for integrative neurology.

Standardising Ayurvedic Diagnosis for Diabetic Neuropathy: The Path Forward

Ayurvedic diagnosis of diabetic neuropathy remains subjective and practitioner-dependent, lacking a standardised, reproducible methodology comparable to modern neurosensory testing. Dashavidha Pareeksha (Tenfold Ayurvedic Examination) could be refined to include mechanoreceptor assessments. A unified Ayurvedic Neuropathy Score integrating VPT, NCS, and Ayurvedic parameters could provide a quantifiable disease severity scale. Developing a multi-centric Ayurvedic Neuropathy Assessment Model integrating Prakriti-Vikriti Analysis, Srotas Examination, and Biothesiometry findings and establishing clinical guidelines for Ayurvedic diagnosis of diabetic neuropathy, allowing for reproducible, evidence-based patient assessment.

- Clinical Impact: Standardized Ayurvedic diagnostics could gain scientific credibility, promoting global acceptance in diabetic neuropathy management.

Multidisciplinary Research: The Need for Ayurveda-Neurology-Biophysics Integration

A collaborative approach integrating Ayurveda, neurology, and biophysics is essential to bridge these research gaps. This would enable Cross-validation of Ayurvedic and modern diagnostic tools (e.g., correlating Biothesiometry with Ayurvedic sensory examination). Hybrid clinical trials combining Ayurvedic and allopathic interventions, measuring mechanoreceptor function pre- and post-therapy. Advanced neuroimaging studies to visualise Ayurvedic treatment effects on neural microstructures (e.g., mechanoreceptors, nerve fibre density).

CONCLUSION

Diabetic neuropathy, marked by progressive mechanoreceptor dysfunction, necessitates a more integrative diagnostic and therapeutic framework. While Biothesiometry quantifies vibratory perception deficits, its Ayurvedic correlation with Sparshanendriya Pareeksha and Majja-Kshaya assessment remains largely unexplored. This study establishes a foundational bridge between Ayurvedic neurophysiology and modern mechanoreceptor pathology, offering a new perspective on diagnostic and therapeutic integration.

Ayurvedic interventions like Basti, Rasayana, and Snehana hold potential for mechanoreceptor regeneration, yet lack robust clinical validation through VPT and NCV parameters. Future interdisciplinary research is essential to standardise Ayurvedic diagnostic protocols, validate therapeutic efficacy, and integrate objective mechanoreceptor assessment methods. By uniting Ayurveda, neurology, and biophysics, this study paves the way for a truly evidence-based, holistic approach to diabetic neuropathy management.

REFERENCES

1. Boulton AJ, Vinik AI, Arezzo JC, et al. Diabetic neuropathies: A statement by the American Diabetes Association. *Diabetes Care*. 2005;28(4):956-962.
2. Dyck PJ, Albers JW, Andersen H, et al. Diabetic polyneuropathy: assessment of nerve damage and its progression. *Lancet Neurol*. 2011;10(10):941-957.
3. Abraira VE, Ginty DD. The sensory neurons of touch. *Neuron*. 2013;79(4):618-639.
4. Feldman EL, Nave KA, Jensen TS, Bennett DL. New horizons in diabetic neuropathy: mechanisms, bioenergetics, and pain. *Neuron*. 2017;93(6):1296-1313.
5. Perkins BA, Bril V. Diabetic neuropathy: a review emphasising diagnostic methods. *Clin Neurophysiology*. 2003;114(7):1167-1175.
6. García-Mesa Y, Feito J, González-Gay M, et al. Involvement of Cutaneous Sensory Corpuscles in Non-Painful and Painful Diabetic Neuropathy. *J Clin Med*. 2021;10(19):4609.
7. Peltier AC, Myers MI, Li J. In Vivo Confocal Microscopy: Its Role in Diagnosing Neuropathic Corneal Changes and Diabetic Neuropathy. *Curr Diab Rep*. 2017;17(5):38.
8. Paré M, Elde R, Mazurkiewicz JE, Smith AM, Rice FL. The Meissner corpuscle revised: a multiafferented mechanoreceptor with nociceptor immunochemical properties. *J Neuroscience*. 2001;21(18):7236-7246.
9. Mathewson RC, Nava PB. Effects of age on Meissner corpuscles: a study of silver-impregnated neurites in mouse digital pads. *J Comp Neurol*. 1984;230(4):499-508.
10. Charaka Samhita, Sutrasthana, 11/43. Sharma RK and Dash B. Varanasi edited: Chaukhambha Sanskrit Series Office; 2009.
11. Charaka Samhita, Chikitsa Sthana, 28/12. Sharma RK and Dash B. Varanasi edited: Chaukhambha Sanskrit Series Office; 2009.
12. Sushruta Samhita, Nidana Sthana, 1/15. Edited by Tripathi R. Varanasi: Chaukhambha Sanskrit Series Office; 2012.
13. Sharma H, Chandola HM. Prameha in Ayurveda: correlation with diabetes mellitus. *Ayu*. 2011;32(4):499-506.
14. Vega JA, García-Suárez O, Montaño JA, Pardo B, Cobo JM. The Meissner and Pacinian sensory corpuscles revisited: new data from the last decade. *Microsc Res Tech*. 2009;72(4):299-309.
15. Charaka S, Sharma RK, Dash B. *Charaka Samhita*. Varanasi: Chaukhambha Sanskrit Series Office; 2008.
16. Sushruta S, Srikantha Murthy KR. *Sushruta Samhita*. Varanasi: Chaukhambha Orientalia; 2012.
17. Vagbhata, Srikantha Murthy KR. *Ashtanga Hridaya*. Varanasi: Chaukhambha Krishnadas Academy; 2011.
18. Madhavakara, Srikantha Murthy KR. *Madhava Nidana (Roga samhita) with 'Madhukosha' Commentary and English Translation*. Varanasi: Chaukhambha Orientalia; 2010.
19. Said G. Diabetic neuropathy—a review. *Nat Clin Pract Neurol*. 2007;3(6):331-340.
20. Vinik AI, Nevoret ML, Casellini C, Parson H. Diabetic neuropathy. *Endocrinol Metab Clin North Am*. 2013;42(4):747-787.
21. Kennedy WR, Wendelschafer-Crabb G, Johnson T. Quantitation of epidermal nerves in diabetic neuropathy. *Neurology*. 1996;47(4):1042-1048.
22. Dyck PJ, Karnes JL, Daube J, O'Brien PC, Service FJ. Clinical and neuropathologic criteria for the diagnosis and staging of diabetic polyneuropathy. *Brain*. 1985;108(4):861-880.
23. Meek PD, McGown PT. Systematic review of randomised controlled trials assessing treatments for dia-

betic peripheral neuropathy. *J Clin Pharm Ther*. 1999;24(6):405-410.
24. Katz J, Rosenbloom BN, Fashler S. Chronic pain, psychopathology, and DSM-5 somatic symptom disorder. *Can J Psychiatry*. 2015;60(4):160-167.
25. Meh D, Denislic M. Quantitative assessment of cutaneous perception in diabetic neuropathy. *J Neurology Sci*. 1994;127(2):186-190.
26. Shy ME, Frohman EM, So YT, et al. Quantitative sensory testing: Report of the Therapeutics and Technology Assessment Subcommittee of the American Academy of Neurology. *Neurology*. 2003;60(6):898-904.
27. Dyck PJ, Giannini C. Pathologic alterations in the diabetic neuropathies of humans: a review. *J Neuropathology Exp Neurol*. 1996;55(12):1181-1193.
28. Cornblath DR. Diabetic neuropathy: diagnostic methods. *Adv Stud Med*. 2005;5(8A):S842-S849.

Source of Support: Nil
Conflict of Interest: None Declared

How to cite this URL: Ankit Kumar & Meha Gandhi: Understanding the Role of Pacinian and Meissner Corpuscles in Diabetic Neuropathy: An Ayurvedic Perspective. International Ayurvedic Medical Journal {online} 2025 {cited March 2025}