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Management of Diabetic Peripheral Neuropathy Using Ayurvedic Protocol: A Case Report

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ABSTRACT

Introduction: Diabetic peripheral neuropathy is the most common complication of diabetes, and can occur in all diabetics regardless of the type. Its diagnosis is clinical, with suggestive history and neurologic examination. Altering the natural history and administering symptomatic treatments are the hallmark of management, but many systems of medicine tried to target multiple pathways have not shown promising results. Hence, options in Ayurveda may be sought.

Case Report: A 49-year-old female patient who presented with numbness over her lower limbs associated with tingling sensation since the past year and who was diagnosed case of diabetic peripheral neuropathy is presented here. She underwent an inpatient treatment protocol, which included oral medicines and external therapies.

Results: Michigan Neuropathy Screening Assessment showed a 50% improvement in the history questionnaire and 80 % improvement in physical examination. In the biothesiometry readings, there was an improvement in vibratory perception by 25 % and 50% in right and left leg respectively.

Conclusion: This case illustrates the potential of an Ayurvedic treatment protocol to manage peripheral diabetic neuropathy.

Key Words: Ayurveda, Case Report, Diabetic neuropathy, Holistic approach, *Prameha*, *Raktavrita vatam*

INTRODUCTION

Neuropathies are common in diabetics¹ and may result in serious consequences including foot ulcers, amputations, silent myocardial infarctions, and premature death.² Diabetic peripheral neuropathy primarily involves the distal portion of the longer myelinated and un-myelinated sensory axons, with sparing of motor axons.³ Symptoms encompass numbness, tingling, burning sensation, a sensation of shooting and cutting pain, walking on cotton wool or glass shards, and feeling of either heat or cold. Conservative management in peripheral diabetic neuropathy aims at symptom relief. The efficacy of an *Ayurvedic* treatment protocol to manage peripheral diabetic neuropathy in a 49-year-old female with gestational diabetes is presented here. The report adheres to the Case Report (CARE) Guidelines to ensure efficacy and transparency in reporting.⁴ Institutional ethics committee clearance was not required; however, writ-

ten informed consent was obtained from the patient before writing her case.

CASE REPORT

In 2015, the patient started experiencing occasional pricking pain in the plantar aspect of both feet. She initially ignored it, but the condition gradually worsened to the point where she started having severe burning sensations, numbness, and tingling sensations. She consulted her allopathic diabetologist for the above and he diagnosed it as Diabetic peripheral neuropathy and prescribed Remylin D tablets. She developed altered sensations in both feet four months ago. She approached Sreedhareeyam Eye Hospital for management of glaucoma, which was diagnosed three months previously, and was offered treatment for both glaucoma and peripheral diabetic neuropathy. She had developed gestational diabetes during her second pregnancy 20 years before. She has been

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using insulin for ten years (30 units in the morning and 10 in the evening). Her father is a known case of diabetes mellitus. Bowel, appetite, micturition, and sleep were normal. Cardiovascular, gastrointestinal, and central nervous systems; and all vital signs were normal.

The examination demonstrated feet devoid of deformities, dry skin, callus, infections, and fissures; absence of ulceration, decreased ankle reflexes, absent vibration perceptions at the great toes. Monofilament examination is a noninvasive examination to test the sensitivity to touch. It is measured by using a thin strand of nylon, which is applied perpendicular to skin in 10 areas of each foot. Biothesiometry, done on six specific areas of both heels, viz., big toe, anterior lateral eminences of the sole on both sides, anterior longitudinal sulcus, plantar region, and heel, demonstrated severe loss of vibratory perception, the mean being 28 volts and 34 volts in right and left foot respectively. Laboratory investigations showed an HbA1c of 6.4%, fasting blood glucose level of 174mg/dL, and post-prandial blood glucose level of 291mg/dL.

The Ayurvedic assessment demonstrated that the patient was *Madhyama Vaya* (middle age), *Kapha-Vata Prakriti* (somatic constitution of *Kapha* and *Vata*), and *Madhyama* (moderate) *Samhanana* (compactness of body parts), *Pramana* (measurement), *Sattva* (psyche), *Satmya* (habituation), *Ahara Sakti* (digestion), and *Vyayama Sakti* (exercise capacity). The disease was explored along the lines of *Prameha Upadrava* (complications of diabetes mellitus) based on her symptoms.

A COVID-19 reverse-transcription polymerase chain reaction (RT-PCR) test done before IP admission turned out to be negative. Her course of inpatient Ayurvedic treatment comprised of oral medicines (Table 1) and external therapies (Table 2). *Pancakarma* (bio-purification) was not attempted due to the severity of the case. She was also placed on a strict dietary regime amounting to a total calorie intake of 1600 Kcal/day, which included regular mild-to-moderate exercise and intake of leafy vegetables, pulses, skimmed milk, and other healthy items; and abstinence from sweet, deep-fried, and starchy foods and products prepared from refined grains. Insulin administration as per dose and time was also adhered to.

Assessment before and after treatments was done with the Michigan Neuropathy Screening Instrument (MNSI),⁵ biothesiometry readings, and laboratory investigations. Improvements in MNSI scores were noted. (Table 3) Biothesiometry readings improved to a stage where the moderate loss of vibratory perception was observed (20.6 and 22.5 volts in right and left foot respectively). (Table 4) FBS taken on October 13th, 2020 showed improvement to 144mg/dL. FBS and PPBS taken on 25th October, 2020 improved to 140mg/dL and 207mg/dL respectively.

Diabetic Powder* (2 tablespoons boiled in 1L of water and taken intermittently after filtering), *Prabhanjana Vimardana-*

Taila and *Sahacaradi Taila* (application 1/2 hour before bath), *Varanadi Kvatha* and *Indukanta Kvatha* (10mL of each decoction boiled in 45mL boiled and cooled water and taken twice a day before food), *Dhanvantara Gutika* (1 tablet powdered and added to the decoctions), and *Vara Churna* (1 tea-spoon of powder with hot water 1/2 hour after dinner) were prescribed at discharge, along with instructions to adhere to a strict diabetic diet and perform regular mild-to-moderate exercise daily.

All medicines were manufactured at Sreedhareeyam Farm-herbs India, Pvt. Ltd., the hospital's GMP-certified manufacturing unit.

DISCUSSION

Diabetes mellitus is considered as *Prameha* as per *Ayurveda*, and is placed among the eight dreadful conditions (*Ashta Mahagada*), viz., *Vatavyadhi* (neurological diseases), *Asmari* (renal calculus), *Kushta* (obstinate skin disorders), *Meha* (obstinate urinary disorders including diabetes mellitus), *Udara* (abdominal enlargement), *Bhagandara* (fistula-in-ano), *Arsas* (haemorrhoids), and *Grahani* (irritable bowel).⁶ All varieties of *Meha*, if untreated, progress to *Madhumeha*, which is *Asadhya* (incurable).

The probable *Nidanas* observed in this patient were overindulgence in foods that were *Guru* (heavy), *Snigdha* (unctuous), *Sita* (cold), and *Picchila* (slimy) by nature. These resulted in *Dhatvagnimandya* (impaired digestion at the level of the tissues), which in turn lead to the production of *Ama* (undigested, toxic waste). The weakened *Agni* was not able to produce proper *Anna Rasa* (the essence of food). *Dhatvagnimandya* of *Medas* (adipose tissue) failed nourishment of the other *Dhatu*s, viz., *Asthi* (bone), *Majja* (marrow), and *Sukra* (seminal fluid), resulting in their *Kshaya* (decrease). This *Kshaya* was manifested in the form of neuropathy and other consequences of diabetes mellitus.

The *Rukshata* (dryness) in the patient's body as a result of increased *Vata* caused a failed vasodilator mechanism that altered the functions of endoneural and epineural blood vessels. Sensory disturbances in this patient were caused by affected *Rakta Dhatu* (blood tissue), It also resulted in *Dhamani Praticaya* (hardening of vessels), a *Nanatmaja Vikara* of *Kapha*, as evidenced by microangiopathy.

Pricking pain in this patient was significant of *Sucibhiriva Tudyate* (feeling of pins and needles), which is a *Lakshana* of *Sonitavrta Vata* described by *Acarya Susruta*⁷ and *Majjavrta Vata* described by *Acarya Caraka*.⁸ Tingling sensation is indicative of *Cumcumayana*, a feature of *Sonitavrta Vata* told by *Acarya Susruta*; *Harsha Lomaharsha*, a feature of *Tvaggata Vata* as per *Susruta* and *Pittavrta Samana Vata* told by *Caraka*. The burning sensation is indicative of *Daha*, a *Purvarupa* and *Upadrava* of *Prameha* told in *Caraka Samhita Nidana*

Sthana; *Vidaha*, a *NanatmajaVikara* told by *Caraka*; *Plosha*, a *NanatmajaVikara* of *Pitta* explained by *AshtangaSangraha*; and *Pariplosha*, a *Lakshana* of *KaphaKshaya* and *RaktaMedogata Pitta* as per *AshtangaSangraha*, and a *Upadrava* of *Pit-taja Prameha* as per *Susruta*. The numbness was indicative of *Supti*, a *Purvarupa* of *Prameha* as per *Caraka Samhita Nidana Sthana*. Abnormal perceptions of pain were indicative of *Toda*, a *Lakshana* of *VyanavrttaPrana* told by *Caraka*; *Sula*, a *Lakshana* of *Prameha Upadrava* told by *Susruta Samhita Nidana Sthana*; and *Bheda*, a *NanatmajaVikara* of *Vata*.

Based on the above, the treatment protocol was adopted to reduce *Prameha* and to nourish the nerves. The common properties of the oral medications are *Kapha-Vata Samana* (pacifying *Kapha* and *Vata*), *Dipana* (appetizing), *Pacana* (digestive), *SrotoSodhana* (channel-cleansing), and *Lekhana* (scarifying). Excess *Snigdha* (unctuous), *Manda* (slow), and *Picchila* (slimy) qualities were avoided as the *Kapha Dosh* was pathologically active. The medicines possess antioxidant, antibacterial, and anti-diabetic properties, which helped to re-establish homeostasis and metabolism, and supply nutrition to the nerves.

The external therapies were aimed at normalizing *Vata*. *Patra Pinda Sveda* enhanced vasodilation and promote the activity of the parasympathetic nervous system by its *Ushna* (hot) property. The *Sukshma* (minute) and *Sara* (fluid) properties enabled dislodging of the adherent *Doshas* and expelling through the pores of the skin as sweat. The use of *Saindhava* and *JambiraSvarasa* enhanced its absorption into the skin and propelled it to dislodge adherent *Doshas*. *Abhyanga* further enhanced vasodilation and transport of nutrients by its application of pressure and motion. The medicines used for *Abhyanga* were *Vataharaby* nature. *Sashtika Sali Pinda Sveda* not only stimulated *Vata* but also nourished the nervous system. The combined effects of the external therapies enhanced nervous activity, stimulated the peripheral nervous system, and enhanced sensitivity, as documented in the biothesiometry readings.

The strict dietary regime was to lower serum glucose, minimize carbohydrates, and restore metabolism. Equal and spaced portions from each of the main food groups were essential to balance the amounts of carbohydrates, vitamins, minerals, and nutrients.

CONCLUSION

A concerted effort by the oral medicines, external therapies, and dietary regime yielded positive results in the patient. At the time of discharge, biothesiometry readings improved and the MNIS showed more positive results. Management of *Meha* may always be a challenge, but concerted efforts by the physician, medicine, attendants, and physicians, the four limbs of treatment, result in positive outcomes. The results obtained in

this report may be analyzed and validated by large-scale sample trials.

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Authors' Contribution:

- Anjaly Naduvathu Vasudevan collected and analyzed the data and prepared the report.
- Jaya Sankar Mundanalyzed the data and reviewed the article.
- Ratna Prava Misraanalyzed the data and reviewed the article.

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Annexure: The Michigan Neuropathy Screening Instrument

Part A: History (to be completed by the patient of diabetes)

Please take a few minutes to answer the following questions about the feeling in your legs and feet. Check 'yes' or 'no' based on how you feel. Thank you.

No.	Question	Yes	No
1	Are your legs and/or feet numb?		
2	Do you ever have any burning pain in your legs and/or feet?		
3	Are your feet too sensitive to touch?		
4	Do you get muscle cramps in your legs and/or feet?		
5	Do you ever have any prickling feelings in your legs or feet?		
6	Does it hurt when the bed covers touch yours kin?		
7	When you get into the tub or shower, are you able to tell the hot water from the cold water?		
8	Have you ever had an open sore on your foot?		
9	Has your doctor ever told you that you have diabetic neuropathy?		
10	Do you feel weak all over most of the time?		
11	Are your symptoms worse at night?		
12	Do your legs hurt when you walk?		
13	Are you able to sense your feet when you walk?		
14	Is the skin on your feet so dry that it cracks open?		
15	Have you ever had an amputation?		

Total _____

B. Physical Assessment (To be completed by a health professional)

1. Appearance of Feet

Right	Left
a. Normal <input type="checkbox"/> 0 Yes <input type="checkbox"/> 1 No <input type="checkbox"/>	Normal <input type="checkbox"/> 0 Yes <input type="checkbox"/> 1 No <input type="checkbox"/>
b. If no, check all that apply:	If no, check all that apply:
Deformities <input type="checkbox"/>	Deformities <input type="checkbox"/>
Dry skin, callus <input type="checkbox"/>	Dry skin, callus <input type="checkbox"/>
Infection <input type="checkbox"/>	Infection <input type="checkbox"/>
Fissure <input type="checkbox"/>	Fissure <input type="checkbox"/>
Other <input type="checkbox"/>	Other <input type="checkbox"/>
specify: _____	specify: _____

	Right			Left		
2. Ulceration	Absent <input type="checkbox"/> 0	Present <input type="checkbox"/> 1		Absent <input type="checkbox"/> 0	Present <input type="checkbox"/> 1	
3. Ankle Reflexes	Present <input type="checkbox"/> 0	Present/ Reinforcement <input type="checkbox"/> 0.5	Absent <input type="checkbox"/> 1	Present <input type="checkbox"/> 0	Present/ Reinforcement <input type="checkbox"/> 0.5	Absent <input type="checkbox"/> 1
4. Vibration perception at great toe	Present <input type="checkbox"/> 0	Decreased <input type="checkbox"/> 0.5	Absent <input type="checkbox"/> 1	Present <input type="checkbox"/> 0	Decreased <input type="checkbox"/> 0.5	Absent <input type="checkbox"/> 1
5. Monofilament	Normal <input type="checkbox"/> 0	Reduced <input type="checkbox"/> 0.5	Absent <input type="checkbox"/> 1	Normal <input type="checkbox"/> 0	Reduced <input type="checkbox"/> 0.5	Absent <input type="checkbox"/> 1
TotalScore _____/10 Points						

Table 1: Oral Medicines

Medicine	Dosage	Anupana	Time	Duration
Diabetic Water*	40mL	-	As and when required	
Varanadi Kvatha	40mL	<i>Sukhoshna Jala</i>	Morning	
KancanaraGuggulu	1 tablet	<i>Varanadi Kvatha</i>		06/10/2020 - 28/10/2020
Dhanvantara Gutika	1 tablet	<i>SukumaraKvatha, Punarnavadi Kvatha</i>	Evening	
KasturyadiGutika				
SukumaraKvatha	60mL	<i>Sukhoshna Jala</i>		
Punarnavadi Kvatha				
HinguTrigunaTaila	15mL	<i>Sukhoshna Jala</i>	Morning	16/10/2020 - 28/10/2020

Table 2: External Therapies for the Case of Diabetic Peripheral Neuropathy

Therapy	Medicine	Procedure	Time	Duration
Patra Pinda Sveda	<i>SigruPatrafor Pinda; Karpura-diTailaand Cincadi Taila for Abhyanga</i>	Two boluses were prepared with leaves of <i>Moringa oleifera</i> Lam., and were applied over the body.	Morning	08/10/2020 - 13/10/2020
Abhyanga	<i>CincadiTaila, Narayana Taila</i>	The lukewarm oil was massaged over the body.	Morning	16/10/2020 - 19/10/2020
Sashtika Sali Pinda Sveda	-	<i>Bala Mula Kvatha</i> and <i>Ksheera</i> were boiled and <i>Sashtika</i> was added to this. The resultant mixture was placed in cloth and formed into a bolus, which was then applied over the body.	Morning	20/10/2020

Table 3: Michigan Neuropathy Screening Instrument

Parameter	Right Leg		Left Leg		Scoring Criteria
	BT	AT	BT	AT	
History	8	4	8	4	Yes: 1; No: 0 (Questions 1-3, 5, 6, 8, 9, 11-15) Yes: 0; No: 1 (Questions 4, 7, 10)
Appearance of the Feet	0	0	0	0	0: Absent; 1: Present
Ulceration	0	0	0	0	0: Absent; 1: Present
Ankle Reflexes	0.5	0.5	0.5	0.5	0: Present; 0.5: Decreased; 1: Absent
Vibration Perception at the Great Toe	1	0	1	0	0: Present; 0.5: Decreased; 1: Absent
Mono-filament	6/10	8/10	5/10	0.5	0: Present; 0.5: Decreased; 1: Absent

BT: before treatment; AT: after treatment

Table 4: Biothesiometry Readings

Examination Areas	Right Heel		Left Heel	
	BT	AT	BT	AT
Big toe	40	36	29	28
The anterior lateral eminence of the sole	31	21	40	13
	24	11	40	28
Anterior longitudinal sulcus	24	20	39	24
Plantar region	22	17	26	25
Heel	30	19	32	17
Total average reading	28	20.6	34	22.5

BT: before treatment; AT: after treatment