



IJPPR

INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH
An official Publication of Human Journals

ISSN 2349-7203



Human Journals

Case Report

August 2020 Vol.:19, Issue:1

© All rights are reserved by Aravind Kumar et al.

Proliferative Diabetic Retinopathy and Its *Ayurvedic* Management: A Case Series



IJPPR

INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH
An official Publication of Human Journals



ISSN 2349-7203

Sreekanth Parameswaran Namboothiri¹, Aravind Kumar^{*2}, Krishnendu Sukumaran³, Agaja Peethambaran Leena⁴, Kavya Rama Varma⁵

¹Chief Medical Officer and Secretary, Sreedhareeyam Ayurvedic Research and Development Institute Nelliakkattu Mana, Kizhakombu, Koothattukulam, 686662, Ernakulam Dt., Kerala, India

²Research Coordinator, Sreedhareeyam Ayurvedic Research and Development Institute, Nelliakkattu Mana, Kizhakombu, Koothattukulam, 686662, Ernakulam Dt., Kerala, India

³Research Coordinator, Sreedhareeyam Ayurvedic Research and Development Institute, Nelliakkattu Mana, Kizhakombu, Koothattukulam, 686662, Ernakulam Dt., Kerala, India

⁴Junior Medical Officer, Sreedhareeyam Ayurvedic Research and Development Institute, Nelliakkattu Mana, Kizhakombu, Koothattukulam, 686662, Ernakulam Dt., Kerala, India

⁵Junior Medical Officer, Sreedhareeyam Ayurvedic Research and Development Institute, Nelliakkattu Mana, Kizhakombu, Koothattukulam, 686662, Ernakulam Dt., Kerala, India

Submission: 27 July 2020
Accepted: 02 August 2020
Published: 30 August 2020

Keywords: *Ayurveda*, holistic approach, case series, herbal medicines, macular edema

ABSTRACT

Introduction: Proliferative diabetic retinopathy (PDR) is characterized by neovascularization or formation of new blood vessels, either at the optic disc or elsewhere in the retina. It may be associated with clinically significant macular edema or cystoid macular edema. As conventional management may not always prove effective, alternative options, including *Ayurvedic* treatment protocols, may be sought. **Case Presentations:** 3 diagnosed cases of PDR were managed using *Ayurvedic* oral medicines, external therapies for the eyes and head, and a dietary protocol at Sreedhareeyam Ayurvedic Eye Hospital and Research Center, India. Although visual acuity did not satisfactorily improve, the multifaceted approach of treatment garnered positive results in both the posterior segment examination and optical coherence tomography (OCT) findings. **Discussion:** *Ayurvedic* diagnostic parameters were explored along the lines of pathological activity of *Tridoshas* (three somatic humors - *Vata*, *Pitta*, and *Kapha*) and *Rakta* (blood tissue), as well as *Timira* or blurring of vision. Treatments were aimed not only at PDR, but also to normalize digestion and metabolism, thus revitalizing normal physiology. **Conclusion:** *Ayurvedic* management, with its dual emphasis on restoring the normal health of the patient and treating the disease, can be a viable option to consider when considering treatment for PDR.



www.ijppr.humanjournals.com

INTRODUCTION:

Diabetic retinopathy (DR), one of the leading causes of preventable blindness among the global working-age population,¹ is projected to increase to 700 million in 2045.² One-third of an estimated 285 million diabetics have vision-threatening DR (VTDR), which includes severe non-proliferative DR (NPDR), diabetic macular edema, and PDR.³ PDR, the most common vision-threatening ocular lesion among type 1 diabetics, presents with macular edema in type 2 diabetics.⁴ Treatment options, viz., LASER photocoagulation, injection of intravitreal steroids and anti-vascular endothelial growth factors (anti-VEGF), and pars plana vitrectomy in advanced cases, may not always prove effective. Hence, options in the realms of complementary and alternative medicine (CAM) such as *Ayurveda*, may be sought. Management of diabetic retinopathy through *Ayurveda* entails not only treating the ophthalmic condition but also diabetes in general.

METHODOLOGY:

A systematic review of data on three patients of proliferative diabetic retinopathy and their specially tailored *Ayurvedic* treatments is described in this series. The Case Report (CARE) guidelines were adhered to to ensure transparency and efficiency in reporting.⁵ Institutional review board approval was not required to prepare this series; however, informed written consent was obtained from the patients before detailing their cases.

CASE NO. 1:

A 67-year-old female presented with a complaint of sudden blurring of vision OU since August 2019 associated with floaters OD. The symptoms commenced suddenly, for which she sought ophthalmic consultation. She underwent one course of injection of Razumab/Accentrix on August 27th, 2019, but no remarkable changes were observed. She consulted Sreedhareeyam Eye Hospital's branch in Bangalore for further options and was advised to report to the main center for inpatient management. She has had diabetes mellitus and hypothyroidism for 12 years and 2 years respectively, and is a known case of iron-deficiency anemia. She underwent angioplasty and stent implantation in June 2017 and September 2019. Her immediate family members do not present with similar ophthalmic complaints. Her personal and social history, vital signs, and review of systems were within normal limits. Unaided DVA was LogMAR 1.4771 OD and LogMAR 0.18 OS, and NVA was N24 OU. Rubeosis iridis was absent OU, the anterior segment examination was normal

OU, and both direct and consensual pupillary reflexes were within normal limits OU. The posterior segment showed retinal hemorrhages and neovascularization OD (**Figure No.1a**) and normal findings OS. OCT macula was not done for this patient.

DVA improved to LogMAR 0.60 OD at discharge, while the other readings were maintained. Posterior segment examination showed reduction in hemorrhages and neovascularization OD. (**Figure No. 1b**)

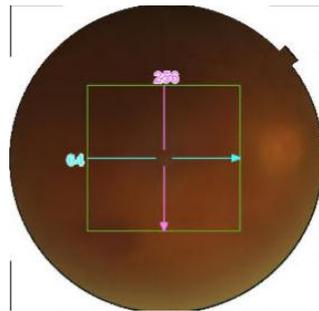


Figure No. 1a: Posterior Segment Examination OD at Admission

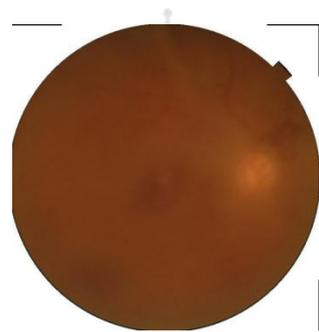


Figure No. 1b: Posterior Segment examination OD at Discharge

CASE NO. 2

A 56-year-old female presented with a 2 1/2-month history of blurring of vision associated with heaviness OD, which was more during the morning hours. When the symptoms appeared, she sought ophthalmic consultation and was advised a two-course injection of anti-VEGF, which was ultimately not done. She has had diabetes for 12 years and cholesterol for 8 years. Her immediate family members do not present with similar complaints. Her personal and social history, vital signs, and review of systems were normal. Unaided DVA was LogMAR 0.77 OD and LogMAR 1 OS, and NVA was N18 OU. DVA OD was corrected to LogMAR 0.6 by a -1.00 diopter cylinder lens with an 80° axis, while DVA OS was corrected to LogMAR 0.3 by a -3.00 diopter cylindrical lens with a 120° axis. Rubeosis iridis was

absent OU, lens examination was normal OU, and other structures of the anterior segment were normal OU. Both direct and consensual pupillary examinations were normal OU. The posterior segment examination showed tortuous blood vessels and neovascularization disc (NVD) OU. **(Figure No. 2a and 2b)** OCT macula showed cystoid macular edema OD **(Figure No. 2c)** and normal findings OS. She was admitted for a 13-day course of *Ayurvedic* inpatient treatment.

Unaided DVA and NVA were maintained at discharge. Posterior segment examination showed reduction in tortuous blood vessels and NVD OU, **(Figure No. 2d and 2e)** and OCT macula showed resolution of the cystoid macular edema OD **(Figure No. 2f)** and maintenance of findings OS. **(Figure No. 2g)** A follow-up consultation showed an unaided DVA of LogMAR 0.6 OD and LogMAR 0.77 OS.

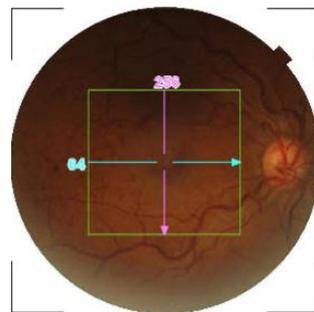


Figure No. 2a: Posterior Segment Examination OD at Admission

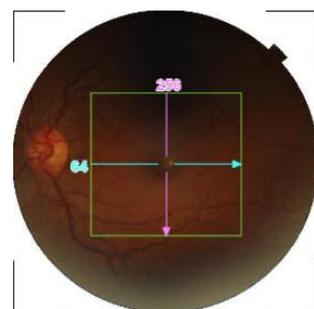


Figure No. 2b: Posterior Segment Examination OS at Admission

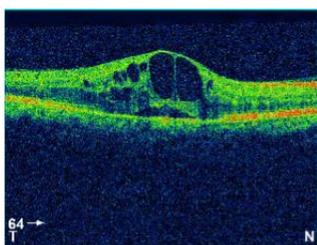


Figure No. 2c: OCT macula OD at Admission

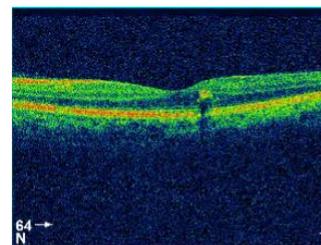


Figure No. 2d: OCT macula OS at Admission

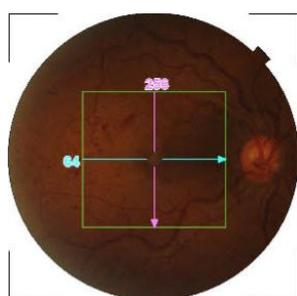


Figure No. 2e: Posterior Segment Examination OD at Discharge

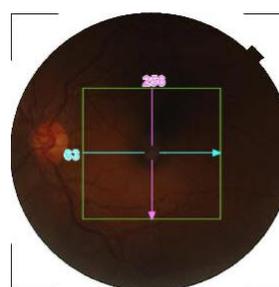


Figure No. 2f: Posterior Segment Examination OS at Discharge

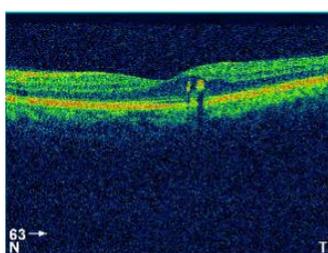


Figure No. 2g: OCT macula OD at Discharge

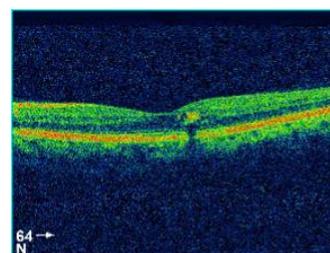


Figure No. 2h: OCT macula OS at discharge

CASE NO. 3

A 56-year-old female presented with a 10-day complaint of blurring of vision OU that was more OS. She first experienced the symptoms 18 years ago, for which she was diagnosed with vitreous hemorrhage and underwent LASER therapy, which provided symptomatic relief. Ten days ago, she experienced a sudden onset of blurring of vision. She was diagnosed with proliferative diabetic retinopathy and was advised LASER treatment, which she declined. She has had diabetes for 20 years, for which she is under medication. Her immediate family members do not present with similar complaints. Her personal and social

history, vital signs, and review of systems were normal. Unaided DVA was LogMAR 0.3 OD and LogMAR 0.477 OS and NVA were N18 OU. Anterior segment examination OU revealed normal findings. Direct and consensual pupillary reflexes were sluggish OU. Posterior segment examination showed normal findings OD and blot hemorrhage, scattered exudates, LASER burns, and neovascularization disc OS. **(Figure No. 3a)** OCT macula showed macular edema OS. **(Figure No. 3b)**. She was admitted for a 15-day course of treatment.

Unaided DVA was maintained OD and improved to LogMAR 0.176 OS, and NVA was maintained OU. Posterior segment examination OS showed a reduction in neovascularization disc, blot hemorrhage, and exudates. **(Figure No. 3c)** OCT macula showed the resolution of macular edema. **(Figure No. 3d)**

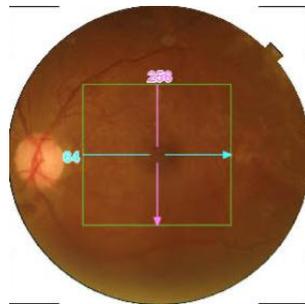


Figure No. 3a: Posterior Segment Examination OS at Admission

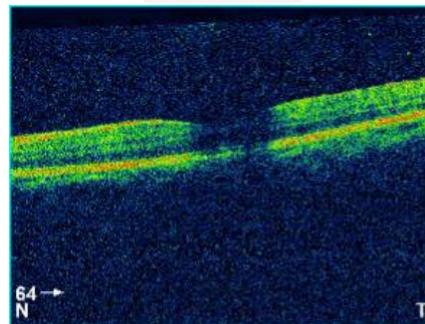


Figure No. 3b: OCT macula OS at Admission

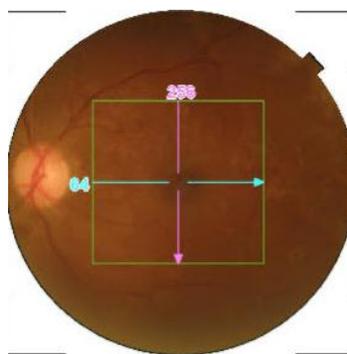


Figure No. 3c: Posterior Segment Examination OS at Discharge

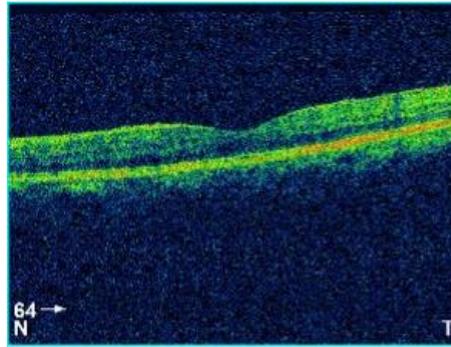


Figure No. 3d: OCT macula OS at Discharge

ADDITIONAL INFORMATION:

The patients' treatment protocols were tailored based on the *Ashta Sthana Pariksha* (8 parameters for examination)⁶ and *Dasavidha Pariksha* (10 parameters of examination).⁷ (**Table No. 1**) Treatments were done with oral medicines, which consisted of *Kvatha* (herbal decoction), tablets, and *Churna* (herbal powder); (**Table No. 2**) external therapies, which comprised of local therapies to both eyes and head; (**Table No. 3**) and a strict dietary regimen.

Panchakarma (five bio-cleansing procedures), generally a requirement for ophthalmic and systemic disorders, were not performed due to the severity of the condition and patient vulnerability.

Fasting blood glucose and post-prandial blood glucose were assessed before and after treatment. (**Table No. 4**) Medicines and instructions to strictly adhere to a diabetic diet and maintain serum glucose were given at discharge.

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

Medicines with * are patents of Sreedhareeyam Ayurvedic Eye Hospital and Research Center. Medicines and therapies with ° were prescribed at discharge.

Each case is chronicled in a separate Timeline of Events, presented in **Table Nos. 5-7**.

Table No. 1: Diagnostic Parameters

Parameter	Patient 1	Patient 2	Patient 3
Ashtasthana Pariksha (8 methods of examination)			
<i>Nadi</i> (pulse)	<i>Kapha Pitta</i>	<i>Kapha Pitta</i>	<i>Kapha Vata</i>
<i>Mutra</i> (urine)	<i>Prakrta</i> (normal)	<i>Prakrta</i>	<i>Prakrta</i>
<i>Mala</i> (excreta)	<i>Prakrta</i>	<i>Prakrta</i>	<i>Prakrta</i>
<i>Jihva</i> (tongue)	<i>Anupalipta</i> (uncoated)	<i>Anupalipta</i>	<i>Anupalipta</i>
<i>Sabda</i> (sound)	<i>Prakrta</i>	<i>Prakrta</i>	<i>Prakrta</i>
<i>Sparsa</i> (touch)	<i>Anushnasita</i> (lukewarm)	<i>Anushnasita</i>	<i>Anushnasita</i>
<i>Drk</i> (sight)	<i>Vaikrta</i> (pathological)	<i>Vaikrta</i>	<i>Vaikrta</i>
<i>Akrti</i> (appearance)	<i>Prakrta</i>	<i>Prakrta</i>	<i>Prakrta</i>
Dasavidha Pariksha (10 methods of examination)			
<i>Prakrti</i> (somatic constitution)	<i>Kapha Pitta</i>	<i>Pitta Kapha</i>	<i>Kapha Vata</i>
<i>Vikrti</i> (status of disease)	❖ <i>Dosha: Kapha</i> ❖ <i>Dhatu: Rasa, Rakta</i>	❖ <i>Dosha: Kapha</i> ❖ <i>Dhatu: Rasa, Rakta</i>	❖ <i>Dosha: Kapha, Vata</i> ❖ <i>Dhatu: Rasa, Rakta</i>
<i>Sara</i> (essence of <i>Dhatu</i> s)	<i>Rakta</i>	<i>Mamsa</i>	<i>Rakta</i>
<i>Samhanana</i> (compactness of body parts)	<i>Pravara</i> (superior)	<i>Pravara</i>	<i>Madhyama</i>
<i>Pramana</i> (measurement of body parts)	<i>Madhyama</i> (moderate)	<i>Madhyama</i>	<i>Madhyama</i>
<i>Sattva</i> (psyche)	<i>Pravara</i>	<i>Madhyama</i>	<i>Madhyama</i>
<i>Satmya</i> (habituation)	<i>Pravara</i>	<i>Madhyama</i>	<i>Madhyama</i>
<i>Ahara Sakti</i> (capacity of digestion)	<i>Madhyama</i>	<i>Madhyama</i>	<i>Madhyama</i>
<i>Vyayama Sakti</i> (capacity for exercise)	<i>Madhyama</i>	<i>Madhyama</i>	<i>Madhyama</i>
<i>Vaya</i> (age)	<i>Madhyama Vaya</i> (middle age)	<i>Madhyama Vaya</i>	<i>Madhyama Vaya</i>

Table No. 2: Oral Medicines

Medicine	Dosage	Anupana (Post-Prandial Beverage)	Time	Case	Duration	Pharmacology	Ayurvedic Pharmacology	Probable Effects
<i>Candraprabha Vati</i>	1 tablet	Boiled and cooled water	Twice a day after food	2	13 days	Anti-diabetic	❖ <i>Tridosa Samana</i> ❖ <i>Balya</i> ❖ <i>Dipana</i> and <i>Pacana</i> ❖ <i>Prameha Hara</i> ❖ <i>Mutrala</i> ❖ <i>Lekhana</i>	❖ Lowered serum glucose and enhanced digestion and metabolism ❖ Reversed the traction of the retina
				3	15 days			
<i>Bhunimbandi Kvatha</i>	60mL	Boiled and cooled water	Twice a day before food	1	24 days	Anti-diabetic, antioxidant	❖ <i>Kapha Pitta Hara</i> ❖ <i>Dipana</i>	❖ Enhanced digestion and metabolism
<i>Samirapancakam Kvatha*</i>	60mL	Boiled and cooled water	6 am and 6 pm	1°	2 months	Antioxidant, anti-diabetic, ophthalmic	❖ <i>Pitta-Kapha Hara</i> ❖ <i>Rakta Prasadana</i> ❖ <i>Sroto Sodhana</i> ❖ <i>Cakshushya</i>	❖ Normalized the retinal blood vessels ❖ Improved eyesight
				2	13 days			
				3	15 days			
<i>Vasa Sree*</i>	1 tablet	Boiled and cooled water	Twice a day after food	1°	2 months	Antioxidant, anti-diabetic, hypolipidemic	❖ <i>Kapha Pitta Hara</i> ❖ <i>Rakta Prasadana</i> ❖ <i>Stambhana</i> ❖ <i>Prameha Hara</i>	❖ Normalized blood vessels ❖ Lowered serum glucose and enhanced digestion and metabolism
				2	13 days			
				3	15 days			
<i>Nisamala</i>	1 tablet	Boiled	Twice	2	13	Anti-	❖ <i>Kapha</i>	❖ Lower

<i>ki</i>		and cooled water	ce a day after food	2°	2 months	diabetic, antioxidant	<i>Pitta Hara</i> ❖ <i>Prameha Hara</i> ❖ <i>Dipana</i>	ed serum glucose and enhanced digestion and metabolism
<i>Bhunimba di Kvatha</i>	60mL	Boiled and cooled water	6 am and 6 pm	2	24 days	Anti-diabetic, antioxidant	❖ <i>Kapha Pitta Hara</i> ❖ <i>Dipana</i>	❖ Enhanced digestion and metabolism

Table No. 3: External Therapies

Treatment	Medicine	Case	Duration	Procedure of Therapy	Mode of Action and Effects
<i>Netra Dhara</i>	<i>Darvyadi Kshira</i>	1	9 days	❖ The patient lay supine and was asked to blink as the decoction was poured in a thin stream from a height of 2 inches over the eyes.	❖ Both procedures stimulated peripheral nerve endings, enhanced local circulation, irrigated obstructive lesions, and facilitated faster mobilization and expulsion of toxins. Height and temperature also facilitated action.
	<i>Mrdvikadi Kvatha</i>	2	9 days		
		3	13 days		
<i>Seka</i>	<i>Kasyapam Kvatha*</i>	1	5 days	❖ The patient lay supine and was asked to keep the eyes closed as the decoction was poured in a thin stream from a height of 2 inches over the eyes.	❖ The medicines stimulated local nerves and blood vessels and prepared the eye for further treatments.
<i>Ascyotana</i>	<i>Veronia cinerea</i> Linn., honey	1	15 days	❖ The patient lay supine and one drop of the medicine was instilled into the sub-conjunctival sac.	❖ The drug fell on the conjunctiva and cornea from a safe height. It also had access to the conjunctival circulation.
	<i>Jatavedha Ghrta*</i> and <i>Vinayakanjana*</i>	1	6 days		
		2	5 days		
		3	3 days		
	<i>Netramrtam*</i>	2°	Twice a day	❖ The patient was asked to slowly rotate the	❖ 80% of the medicine was absorbed through
3		13 days			

Anjana	Eye Plus*	2°	Twice a day	eyes after instillation with the eyes closed.	the ocular layers. ❖ Medicines dropped continuously from a height slightly increased the temperature and allowed faster absorption and less disposal. ❖ Penetration to deeper structures was facilitated by bypassing the ocular barriers because of topical application. ❖ The medicines improved eyesight and strengthened the eyes. The cooling nature of the medicines normalized retinal blood vessels.
	Netra Sudha* (°)	1	15 days		
		1°	Twice a day		
	Candanadi Anjana (°)	3	5 days		
2		9 days			
Pindi	Mukkadi Purampada and Lakshadi Churna	1	15 days	❖ A semisolid paste was prepared by mixing the ingredients with water. This was tied in two cotton pads and placed over the closed eyes.	❖ The paste and poultice exerted gentle pressure over the eyelids while a counter-pressure was exerted from the eyeball. This promoted retinal vasodilation and absorption of excess fluid from the retina.
	Haritaki Curna. Mukkadi Gutika, Karutta Gutika	3	13 days		
	Haritaki Curna. Mukkadi Gutika,		2 days		
Bandhana	Flowers of <i>Jasminum grandiflorum</i> Linn.	1	6 days	❖ The flowers were placed with their stems pointing upwards on two pieces of cotton. This was placed in a gauze bandage and put over the eyes.	❖ The cooling nature of the flowers relaxed the eye and cooled it down. ❖ It relaxed the eyes after topical instillation.
		2	5 days		
		3	3 days		

<i>Siroveshtana</i>	Powder of <i>Adathoda vasica</i> Nees., <i>Terminalia chebula</i> Retz., <i>Terminalia bellerica</i> Linn, <i>Embllica officinalis</i> Gaertn., and <i>Laccifer lacca</i> Kerr., and <i>Vasa Guducyadi Kvatha</i>	1	7 days	A semisolid paste prepared by mixing 45g of all ingredients with the desired liquid medium was smeared over a Cora cloth and applied to the head (area with the paste facing inwards) in the following manner:	<ul style="list-style-type: none"> ❖ Penetration through the five layers of the scalp was facilitated. ❖ Cell membranes absorbed the lipid-soluble extracts and facilitated entry into the systemic circulation. ❖ Massage with oil before application of the paste generated heat and enhanced vasodilation, which allowed the lipids in the oil to absorb the essential elements of the paste. ❖ The plantain leaf kept over the head in <i>Talapoticchil</i> maintained an optimum temperature throughout the procedure.
	<i>Vasa Lakshadi Churna, Vasa Guducyadi Kvatha, Karutta Gutika</i>	3	9 days	<ul style="list-style-type: none"> ❖ One end of the cloth was anchored above the right ear. ❖ The cloth was wrapped over the forehead above the eyebrows and towards the left ear. ❖ From the left ear, the cloth was wrapped around the back of the head and brought upwards around the head while the vertex is avoided. ❖ The other end of the cloth was applied to the top of the head. ❖ Any leftover paste was applied to the uncovered portion of the head. 	
<i>Talapoticchil</i>	Powder of <i>Adathoda vasica</i> Nees., <i>Terminalia chebula</i> Retz., <i>Terminalia bellerica</i> Linn, <i>Embllica</i>	1	9 days	<ul style="list-style-type: none"> ❖ A paste prepared from 30g of herbal powder and 60mL of herbal decoction was applied over a steamed plantain 	
		3	7 days		

	<i>officinalis</i> Gaertn., and <i>Laccifer lacca</i> Kerr., and <i>Vasa</i> <i>Guducyadi</i> <i>Kvatha</i>			leaf. ❖ This leaf is then placed with the paste inwards over the patient's head and tied down using a Cora cloth.	
Takradhara	<i>Vasa</i> <i>Guducyadi</i> <i>Kvatha</i> and <i>Takra</i>	2	9 days	❖ 2L of milk was boiled with 4L of water. The herbal decoction was added to this and boiled until 2L of milk remained. This was left to ferment overnight, after which it was churned and buttermilk obtained. ❖ The patient lay supine on the treatment table. A thin cloth band was tied around the forehead. A pot with an 8mm hole in the center of the bottom was suspended above the patient's head with ropes and a cotton wick was placed in the hole. The buttermilk was poured into the pot and was allowed to drain through the hole onto the patient's head. The pot was moved from side to side.	❖ Factors such as streaming, pressure, and temperature of the medicine enabled vasodilation, which allowed penetration through the follicular pores to the follicles. ❖ Stimulation of the somato-autonomic nervous system occurred through sensors in the skin and hair follicles via the trigeminal nerve. ❖ Decreased stimulation of the sympathetic nervous system occurred by reduction of metabolic processes. ❖ The antioxidant and antimicrobial properties of buttermilk helped to revert metabolism.

Table No. 4: Laboratory Investigations

Parameter	Case 1		Case 2		Case 3	
	BL	EP	BL	EP	BL	EP
Fasting Blood Glucose	197 mg/dL	94 mg/dL	106 mg/dL	99 mg/dL	78 mg/dL	71 mg/dL
Post-Prandial Blood Glucose	270 mg/dL	234 mg/dL	181 mg/dL	129 mg/dL	224 mg/dL	124 mg/dL

BL: baseline; EP: endpoint

Table No. 5: Timeline for Case 1

Date	Event
08/2019	❖ The patient suddenly experiences blurring of vision OU and floaters OD
27/08/2019	❖ Undergoes one injection of Razumab/Accentrix, which does not produce significant results
09/2019	❖ Consults a branch unit of Sreedhareeyam Eye Hospital and is advised to report to the main center in Kerala
16/11/2019	❖ Consults Sreedhareeyam's main hospital and is advised inpatient management
	❖ DVA (unaided): LogMAR 1.4771 OD, LogMAR 0.18 OS
	❖ NVA: N24 OU
	❖ Anterior Segment: Within normal limits OU, rubeosis iridis absent OU
	❖ Pupillary examination: Normal direct and consensual reflexes OU
16/11/2019	❖ Posterior Segment: Hemorrhages and neovascularization OD, normal findings OS
	❖ <i>Bhunimbadi Kvatha</i> is started.
17/11/2019	❖ <i>Temporal Lepa, Ascyotana, Anjana, and Netra Dhara</i> are started.
21/11/2019	❖ <i>Siroveshtanam</i> is started.
25/11/2019	❖ <i>Netra Dhara</i> is stopped.
27/11/2019	❖ <i>Siroveshtanam</i> is stopped.
28/11/2019	❖ <i>Talapoticchil</i> is started.
29/11/2019	❖ <i>Temporal Lepa</i> is stopped.
01/12/2019	❖ <i>Ascyotana, Anjana, and Pindi</i> are stopped.
04/12/2019	❖ <i>Ascyotana and Bandhana</i> are started.
08/12/2019	❖ <i>Ascyotana and Bandhana</i> are started.
09/12/2019	❖ Oral medicines and treatments are stopped.
	❖ DVA (unaided): LogMAR 0.60 OD, LogMAR 0.18 OS
	❖ NVA: N24 OU
09/12/2019	❖ Posterior Segment: Reduction in hemorrhages and neovascularization OD

Table No. 6: Timeline for Case 2

Date	Event
02/2019	<ul style="list-style-type: none"> ❖ Patient experiences blurring of vision associated with heaviness OD ❖ Seeks ophthalmic consultation and is advised anti-VEGF injections, which are not done
02/2019 - 05/2019	<ul style="list-style-type: none"> ❖ Seeks ophthalmic consultation and is advised anti-VEGF injections, which is not done
05/12/2019	<ul style="list-style-type: none"> ❖ Consults Sreedhareeyam Hospital and is prescribed inpatient management.
	<ul style="list-style-type: none"> ❖ DVA (unaided): LogMAR 0.77 OD, LogMAR 1 OS ❖ Refraction: LogMAR 0.6 OD with a -1.00 diopter cylinder lens with 80° axis; LogMAR 0.3 OS with a -3.00 diopter cylindrical lens with a 120° axis ❖ NVA: N18 OU ❖ Anterior Segment: Within normal limits OU, rubeosis iridis absent OU ❖ Pupillary Examination: Normal direct and consensual reflexes OU ❖ Posterior Segment: Tortuous blood vessels and neovascularization disc OU ❖ OCT: Cystoid macular edema OD, normal findings OS
	<ul style="list-style-type: none"> ❖ <i>Samirapancakam Kvatha*</i>, <i>Candraprabha Vati</i>, <i>Nishamalaki</i>, and <i>Vasa Sree*</i> are started. ❖ <i>Netra Dhara</i>, <i>Anjana</i>, and <i>Talapoticchil</i> are started.
09/12/2019	<ul style="list-style-type: none"> ❖ <i>Talapoticchil</i> is stopped. ❖ <i>Takradhara</i> is started.
13/12/2019	<ul style="list-style-type: none"> ❖ <i>Netra Dhara</i> and <i>Anjana</i> are stopped.
14/12/2019	<ul style="list-style-type: none"> ❖ <i>Ascyotana and Bandhana</i> are started.
17/12/2019	<ul style="list-style-type: none"> ❖ <i>Takradhara</i> is stopped.
18/12/2019	<ul style="list-style-type: none"> ❖ Oral medicines and treatments are stopped.
	<ul style="list-style-type: none"> ❖ DVA (unaided): LogMAR 0.77 OD, LogMAR 1 OS ❖ NVA: N18 OU ❖ Posterior Segment: Normal vessel contour and reduced neovascularization OD ❖ OCT: Resolution of cystoid macular edema OD
21/01/2020	<ul style="list-style-type: none"> ❖ DVA (unaided): LogMAR 0.6 OD and LogMAR 0.77 OS ❖ NVA: N18 OU

Table No. 7: Timeline for Case 3

Date	Event
2002	<ul style="list-style-type: none"> ❖ First experiences blurring of vision. ❖ Gets diagnosed with vitreous hemorrhage and undergoes pan-retinal LASER photocoagulation, which provides symptomatic relief.
07/01/2020	<ul style="list-style-type: none"> ❖ Gets the same symptoms again. ❖ Diagnosed with proliferative diabetic retinopathy and is advised pan-retinal LASER photocoagulation, which she declines.
17/01/2020	<ul style="list-style-type: none"> ❖ Consults Sreedhareeyam Hospital and is advised inpatient management.
	<ul style="list-style-type: none"> ❖ DVA (unaided): LogMAR 0.3 OD, LogMAR 0.477 OS ❖ NVA: N18 OU ❖ Anterior Segment: Normal findings OU ❖ Pupillary Examination: Normal responses to both direct and consensual reflexes ❖ Posterior Segment: Normal findings OD, blot hemorrhage, scattered exudates, LASER burns, and neovascularization disc OS ❖ OCT: Macular edema OS
	<ul style="list-style-type: none"> ❖ <i>Samirapancakam Kvatha*</i>, and <i>Vasa Sree*</i> are started. ❖ <i>Netra Dhara, Anjana, Pindi, Sirolepam,</i> and <i>Siroveshtanam</i> are started.
	<ul style="list-style-type: none"> ❖ <i>Siroveshtanam</i> is stopped. ❖ <i>Talapoticchil</i> is started.
25/01/2020	<ul style="list-style-type: none"> ❖ <i>Siroveshtanam</i> is stopped. ❖ <i>Talapoticchil</i> is started.
27/01/2020	<ul style="list-style-type: none"> ❖ <i>Sirolepam</i> is stopped.
29/01/2020	<ul style="list-style-type: none"> ❖ <i>Anjana</i> and <i>Pindi</i> are stopped. ❖ <i>Ascyotana</i> and <i>Bandhana</i> are started.
30/01/2020	<ul style="list-style-type: none"> ❖ <i>Temporal Lepa</i> is started.
31/01/2020	<ul style="list-style-type: none"> ❖ All medicines and treatments are stopped.
	<ul style="list-style-type: none"> ❖ DVA (unaided): LogMAR 0.3 OD, LogMAR 0.176 OS ❖ NVA: N18 OU ❖ Posterior Segment: Reduction in neovascularization disc, hemorrhages, and exudates OS ❖ OCT: Resolution of macular edema OS

DISCUSSION:

Diabetes mellitus, closely compared to *Prameha* or *Meha* in the *Ayurvedic* canon, denotes a set of clinical disorders with frequent abnormal micturition.⁸ *Prameha* is caused by an increase of *Kapha Dosh*a (humor responsible for stability) by indulgence in sweet, sour, lipid-rich, heavy, greasy, and difficult-to-digest foods and drinks; and sedentary habits such as laziness, want of exercise, and sleeping, especially during the day.⁹ It has twenty different types based on *Doshas* (somatic humors), viz., 10 by *Kapha* (humor responsible for stability), 6 by *Pitta* (humor responsible for metabolism), and 4 by *Vata* (humor responsible for movement).¹⁰

Meha as a cause for *Netra Roga* (ophthalmic disease) was told by the *Netra Prakasika*, an ancient work on *Ayurvedic* ophthalmology.¹¹ The *Samprapti* (pathogenesis) of diabetic retinopathy in *Ayurveda* revolves around *Srotobhishyanda* (pathological oozing from the *Srotas* or metabolic channels) and *Raktavaha Sroto Dushti* (the pathological activity of the blood-carrying channels) resulting from increased *Pitta* caused by diets and lifestyle choices detrimental to eye health followed by diabetic patients.¹² The increased *Pitta* amalgamates with the already-increased *Kapha* to pathologically increase blood and cause the characteristic fundus findings in DR. It results in hypoxia due to *Kapha* obstructing the path of *Vata* to deliver essential nutrients such as oxygen to the eye. *Vata* undergoes *Avarana* (occlusion) with *Rakta* due to hypoxia, resulting in increased blood viscosity, decreased activation of leucocytes, aggregation of red blood cells, and decreased blood flow. This starts a cascade of events that results in retinal ischemia, resulting in neovascularization, the hallmark feature of PDR. Defective vision in DR is due to the *Doshas* settling into the *Drishiti Patalas* (functional parts of vision), and causing symptoms ranging from indistinct vision to complete blindness. Macular edema may be caused by settling of the *Doshas* at the macula and obstructing *Vyana Vata* (*Vata* responsible for circulation) and causing swelling in the region. Retinal detachment in DR is *Upadrava* (complication) caused by the displacement of the macula by increased *Kapha*. Neovascularization can be correlated with *Vimarga Gamana*, in which nutrients are supplied elsewhere. *Sanga* or obstruction can be taken as edema as there are restricted flow and accumulation. *Sira Granthi* is the formation of scarring as a precursor to retinal detachment.

The probable *Ayurvedic* and modern pharmacology, mode of action, and effects of oral medicines and external therapies are described in **Tables 2** and **3**.

The *Netra Kriyakalpa* (local ophthalmic procedures) and treatments for the head were done as per the classical references. *Netra Dhara*, a modified version of classical *Seka*¹³ practiced in Sreedhareeyam Hospital, is a procedure in which the patient slowly blinks during ocular irrigation. Classical *Anjana* (collyrium) is done by moving the tip of a rod with medicine on it in the lower bulbar conjunctiva from the inner canthus to the outer canthus and back again.¹⁴ However, it is done in the same manner as classical *Ascyotana*¹⁵ in Sreedhareeyam due to hygienic constraints. *Siroveshtanam* is a treatment procedure in which the paste is kept on a Cora cloth and tied around the head while anchoring one end over the left ear and tying the other end over the top of the cranium.

Food items from all major food groups except meat, fish, and poultry, were advised in the right quantity. Vegetables and pulses were advised for liberal use without adding extra dressing and oil because of their high concentrations of fiber. Oils, lipids, and sweets were restricted. Wrong concepts of food intake such as intermittent fasting, avoiding rice, and adherence only to wheat was not advised. Products prepared from refined flour were strictly advised against as they increase serum glucose. Mild to moderate exercise was also advised.

Maintenance of vision was the major challenge faced in managing the cases; the patients' vision was still blurred although post-treatment posterior segment examination and OCT scanning showed a substantial reduction in macular edema and other findings. A combination of oral medicines, external treatments, and dietary and lifestyle restrictions during and after treatment demonstrated positive ocular and systemic results. Overall satisfaction was reported by the patients during their treatments. The results obtained in this series may be further validated using large-scale sample trials.

ACKNOWLEDGMENT:

The authors thank Sreedhareeyam Ayurvedic Eye Hospital and Research Center, and Sreedhareeyam Farmherbs India Pvt. Ltd., for their help in preparing this case report. The authors acknowledge the immense help received from the scholars whose articles are cited and included in references to this manuscript. The authors are also grateful to the authors/editors/publishers of all those articles, journals, and books from where the literature for this article has been reviewed and discussed.

Conflicts of Interest: None declared

Sources of Funding: None declared

REFERENCES:

1. Thomas RL., Halim S, Gurudas S, Sivaprasad S., Owens DR., IDF Diabetes Atlas: A review of studies utilizing retinal photography on the global prevalence of diabetes-related retinopathy between 2015 and 2018, *Diabetes Research and Clinical Practice*, 2019, Vol. 157, pgs. 1-13
2. Saeedi P, Petersohn I, Salpea P, Malanda B, Karuranga S, Unwin N, *et al.* Global and regional diabetes prevalence estimates for 2019 and projections for 2030 and 2045: results from the International Diabetes Federation Atlas, 9th edition. *Diabetes Research and Clinical Practice* 2019; Vol. 157
3. Yau JW, Rogers, S. L., Kawasaki, R., Lamoreux, E. L., Kowalski, J. W., Bek, T. *et al.*, Global prevalence and major risk factors of diabetic retinopathy, *Diabetes Care*, 2012, Vol. 35, Issue 3, pgs. 556-64
4. Lee R, Wong TY, Sabanayagam C, Epidemiology of diabetic retinopathy, diabetic macular edema, and related vision loss, *Eye and Vision*, 2015, Vol. 2, Issue 17, pgs. 1-25
5. Gagnier J, Kienle G, Altman DG, Moher D, Sox H, Riley DS, CARE group, The CARE guidelines: Consensus-based clinical case-reporting guideline development, *Global Advances in Health and Medicine*, 2013, Vol. 2, Issue 5, pgs. 38-43
6. Kumari A (Ms.), Tiwari PV (Ms.), *Yogaratnakara: A Complete Treatise on Ayurveda, Part I*, Chaukhambha Vishwabharati, Varanasi, First Edition, 2010, pgs. 7-20
7. Sharma RK, Dash B, *Caraka Samhita: Text with English Translation and Critical Exposition based on Cakrapani Datta's Ayurveda Dipika, Vol. II*, Chaukhambha Sanskrit Series Office, Varanasi, Reprint 2013, pgs. 260-278
8. Sharma H, Chandola HM, *Prameha in Ayurveda: Correlation with Obesity, Metabolic Syndrome, and Diabetes Mellitus, Part 1-Etiology, Classification, and Pathogenesis*, *The Journal of Alternative and Complementary Medicine*, 2011, Vol. 7, Issue 6, pgs. 491-496
9. Murthy KRS, *Madhava Nidana (Roga Viniscaya) of Acarya Madhavakara*, Chaukhambha Orientalia, Varanasi, Reprint 2013, pg. 117
10. Sharma RK, Dash B, *Caraka Samhita: Text with English Translation and Critical Exposition based on Cakrapanidatta's Ayurveda Dipika, Vol. III*, Chaukhambha Sanskrit Series Office, Varanasi, Reprint 2013, pg. 299
11. Shankar U, *Netra Prakasika of Ayurveda Shatpannasara*, Chaukhambha Vishwabharati, Varanasi, 2013, pg. 31
12. Sahoo PK, Fiaz S, Conceptual analysis of diabetic retinopathy in Ayurveda, *Journal of Ayurveda and Integrative Medicine*, 2017, Vol. 8, pgs. 122-131
13. Murthy PHC, *Sarngadhara Samhita of Sarngadharacarya*, Chaukhambha Sanskrit Series Office, Varanasi, 2013, pg. 399
14. Sharma PV, *Susruta Samhita: With English Translation of Text and Dalhana's Commentary along with Critical Notes, Vol. III*, Chaukhambha Vishwabharati, Varanasi, 2010, pg. 221
15. Murthy KRS., *Ashtangahrdaya of Vagbhata: Text, English Translation, Notes, Appendices, and Index, Vol. I.*, Krishnadas Academy, Varanasi, 1999, pg. 276