

## Case Report

# Role of Low Carbohydrate Diet and Panchakarma Therapy in Reduction of HbA1c with Special Reference to Diabetic Retinopathy in Type 2 Diabetes Mellitus - Case Series

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**Abstract:** Diabetes Mellitus (DM, Type I and II included) are prevalent metabolic disorders that cause high blood sugar levels over an extended period of time due to unhealthy lifestyle modifications. Diabetic retinopathy (DR) is a complication that causes abnormalities in the retina to be seen as early as 10 years after the onset of DM or even earlier. The DR is main cause of visual impairment in patients with DM. Considering the limitations of standard treatments for DR there is a need for complementary medicine. Panchakarma has been documented to be effective in controlling DM. This article explores the role of diet and panchakarma in three different patients suffering with DR. The patients underwent eye assessment and evaluation of the various risk factors for DR followed by study therapy. The eye evaluations post study therapy show improvement in near vision and visual acuity in both eyes of the three patients described herein. In these patients, ophthalmoscopy confirmed that the exudates and haemorrhages were decreased post-treatment. We report no side effects or adverse events related to study therapy in the concerned patients. Hence, DR may be prevented by strict glycemic control and annual dilated eye examination by an ophthalmologist. Therefore, we conclude positive effect of study therapy for DM patients with DR. Studies with larger sample size and follow up are warranted to generalize this finding.

**Keywords:** Case Series, Panchakarma, Diabetic Retinopathy, Low Carbohydrate Diet, Retina

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## 1. Introduction

Diabetes Mellitus (DM) is a metabolic condition characterized by unusually high blood sugar levels as a result of a combination of environmental or inherited causes. High blood sugar levels for a long time can harm the entire body and its processes, leading to diabetic neuropathy, diabetic nephropathy, and diabetic retinopathy. [1]

Diabetic retinopathy (DR) is caused by progressive damage to the blood vessels of the light-sensitive tissue in the retina. The standard treatment for DR is LASER Photocoagulation,

which prevents blood and fluid leaking in the retina but does not address the underlying pathophysiology of the disease [2, 3]. DR is characterized by haemorrhages, abnormal growth of blood vessels, hard exudates, aneurysms, and cotton wool spots eventually leading to partial/complete blindness. [3, 4]. The duration of the disease is the best predictor of DR while severity of hyperglycaemia is key alterable risk factor associated with DR.

## 2. Case Description

Patient 1 (P1): Male, 59 years old. Disease history: CAD – Percutaneous transluminal coronary angioplasty, hypothyroid, uncontrolled DM (1997 first diagnosis of DM and on Insulin treatment since 2007). He approached Ayurveda based clinic (Madhavbaug clinic) in 2017 for the treatment of the same. (2019: Acute Cerebrovascular Accident with Left Thalamic Infarct, 2021: Hospitalized for breathlessness associated with COVID-19 and treated with Steroids). He had uncontrolled DM and vitreous haemorrhage.

Patient 2 (P2): Male, 56 years old. Disease history: hypothyroidism (2007) and uncontrolled DM, acute coronary syndrome, and acute kidney disease. Elevated creatinine phosphokinase-MB level and serum creatinine level=2.26. In 2020, he was diagnosed with DR, 18/10/2020 patient was

advised high-risk coronary artery bypass grafting, 27/10/2020, he opted for ayurveda based treatment where specific diet regime and oral medicines were started.

Patient 3 (P3): Female, 62 years old. Disease history: hypertension (2010), uncontrolled DM (2012), started insulin (2015). In 2021, the patient was diagnosed with DR and opted for ayurveda based treatment.

The duration of DR in all the 3 cases ranged from one to two years.

Clinical Symptoms: DR related clinical symptoms seen in patients were ranging from blurred vision, floaters and flashes, partial vision loss, dark areas in the vision, distorted vision to poor night vision [3, 5, 6].

Patient Assessment: Height, Weight, BMI, Abdominal Girth, Heart Rate, ECG, BP, Random Blood Sugar, HbA1c (Monthly) Retina Scan (2) repeated after 3 months (Table 1).

*Table 1. Clinical and demographic details.*

Day 1 Weight	Latest Weight	Day 1 BMI	Latest BMI	Day 1 HbA1c	DAY30 HbA1c	DAY 60 HbA1c	Latest HbA1c	Symptoms of Retinopathy		Signs of DRN	
								Before	After	Before	After
82	69	30	25	10	6.1	7.2 (COVID -19)	6.7	Blurred Vision +++, Floaters and flashes+,, Partial loss of vision+++	Blurred Vision +, Floaters and flashes+,	Both Eyes Proliferative diabetic retinopathy with diffuse Vitreous haemorrhage	No fresh Bleeding, No edema
54	52	22	21	8.9	7.4	6.7	6.1	Blurred Vision ++, Dark areas in the vision++, Poor night vision+++,, FLUCTUATING VISION+++	Poor night vision+, FLUCTUATING VISION+	Viteroushaemorrhage with diffuse Right eye Fresh Bleed	No fresh Bleeding, No edema
60	49	25	20	8.8	7.5	6.8	6.8	Blurred Vision +,, Distorted vision ++, Poor night vision+++,,	Blurred Vision +,	Macular Edema with Vitreous haemorrhage both eyes	No fresh Bleeding, No edema

Eye Assessment (Figures 1, 2 and 3) using ophthalmoscopy.

### Treatment

Treatment included Panchakarma and diet modification [3]. Along with this, ayurvedic oral medicines were started. These included Gudmar, Amalaki, Haridra and Daruharidra. For all cases, Panchakarma: 1) centripetal oleation / neem siddha tail) 2) thermal vasodilation / dashmoolkadha 3) prdaorgdykwath is applied. [4, 6-8]

Patient were advised a low carbohydrate diet (800-1000 kilocalories). Diets are based on the principle that a diet very low in carbohydrates leads to a reduction in the body's insulin requirement., lower insulin levels, causes the body to burn stored fat and use it as main energy source.

### 2.1. Patient 1

Before: Vitreous Haemorrhage (left eye more than the right eye).

Left eye: Long standing vitreous haemorrhage, hazy view of fundus due to haemorrhage.

The scan was not possible due to vitreous haemorrhage.

After: Resolved vitreous haemorrhage in both eyes.

### 2.2. Patient 2

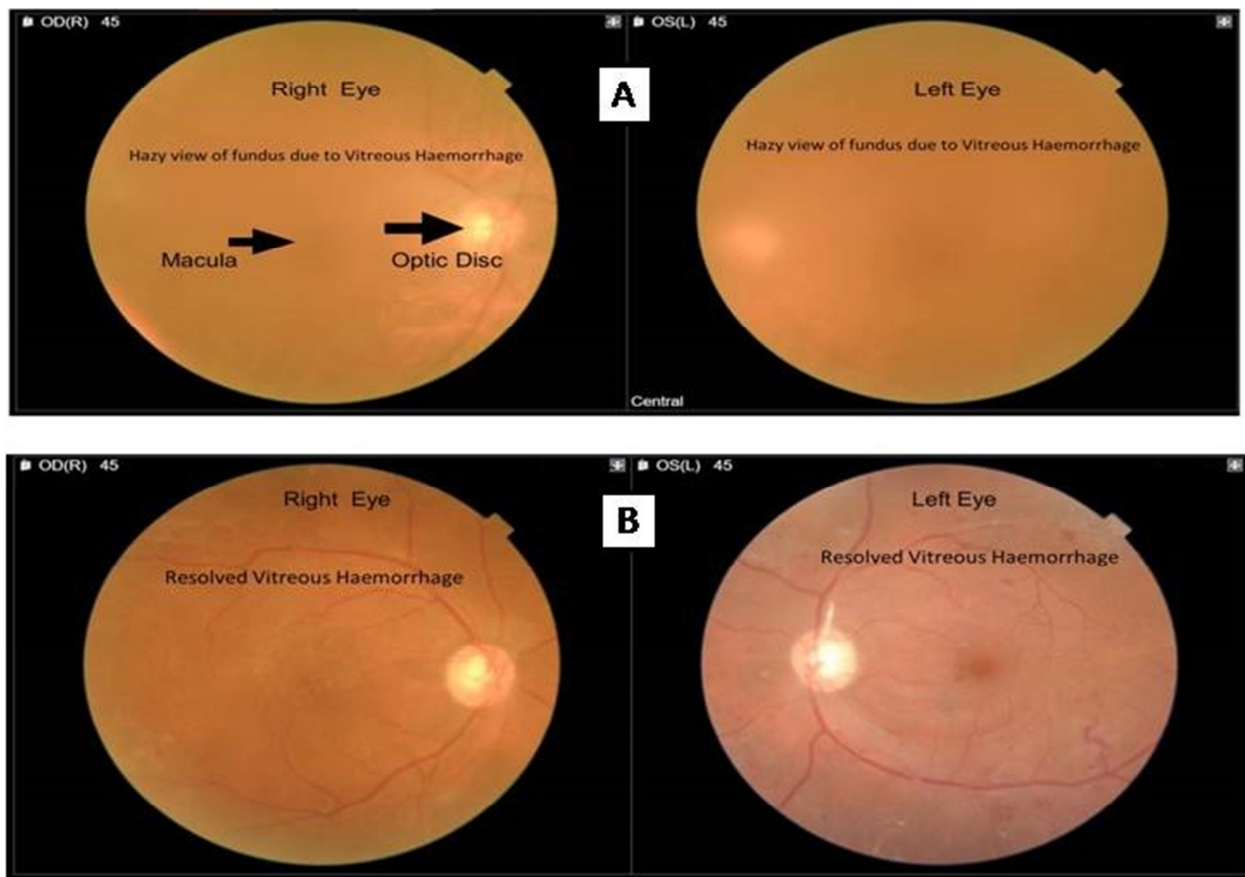
Before: Right eye infero temporal fresh bleed, supero temporal fresh bleed. Left eye inferior bleed resulting in hazy view of retina, inferior blood vessels not visible. Multiple hard exudates. Proliferative diabetic retinopathy with vitreous haemorrhage.

After: - Right eye resolved vitreous haemorrhagelasered retina. Left eye fresh neovascularisation with fresh bleed infero temporally lasered retina.

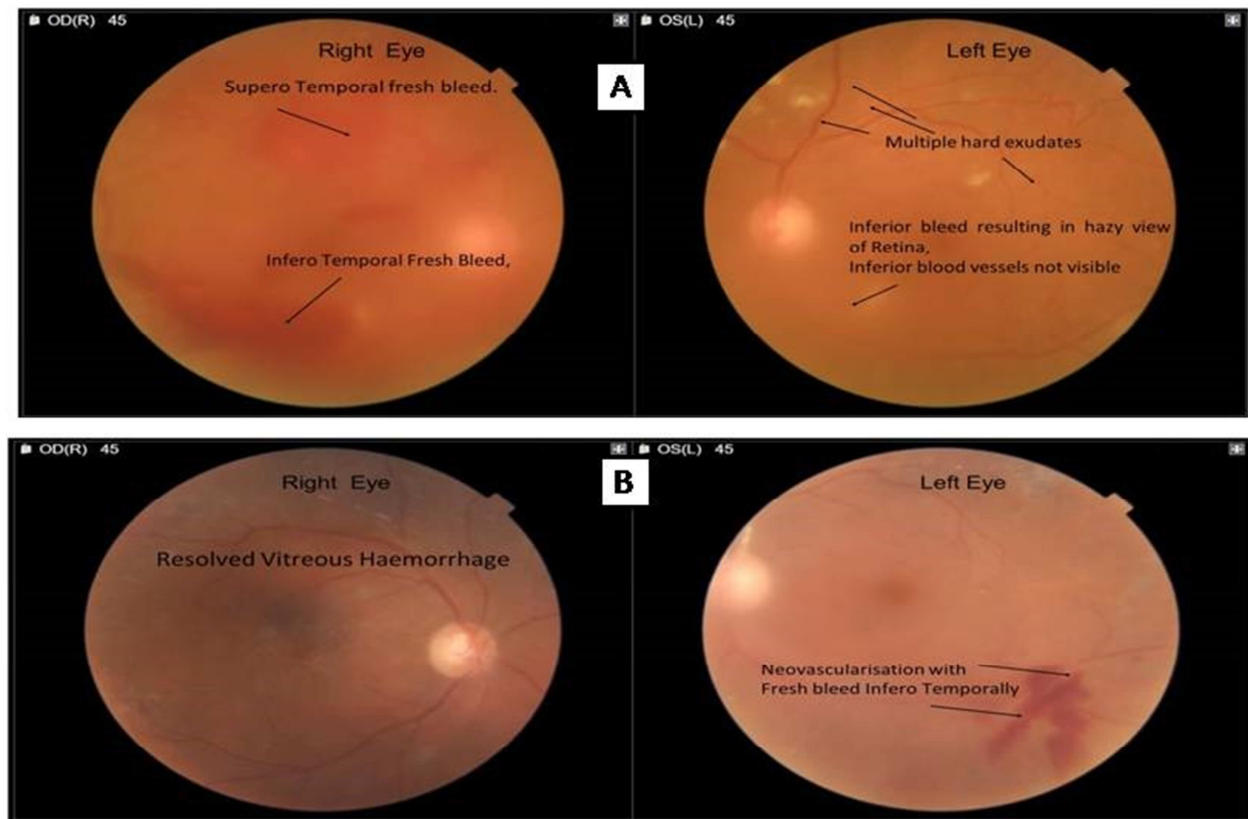
### 2.3. Patient 3

Before: Right eye cystoid macular edema, clinically significant macular edema. Left eye cystoid macular edema with epiretinal membrane.

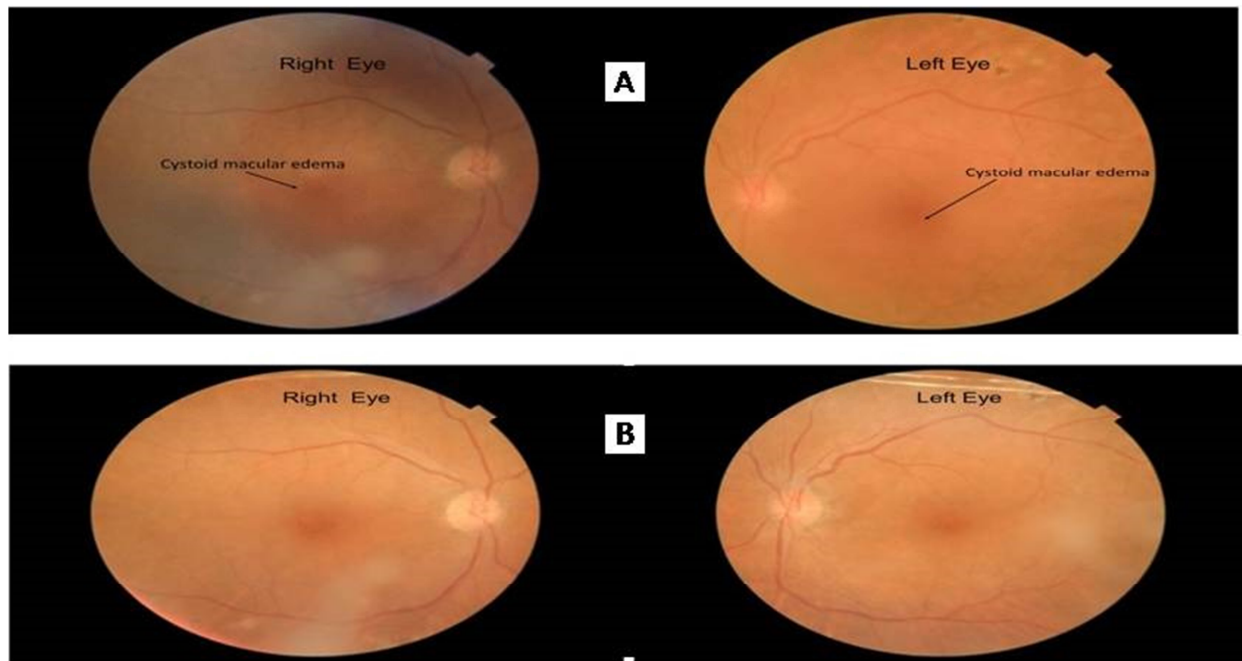
After: Right eye resolved macular edema with few cystic spaces. Left eye resolved macular edema with Vitreo Macular Traction.



**Figure 1.** Patient 1 retina scan, A: Before – vitreous hemorrhage in both eyes; B: After – resolved vitreous hemorrhage in both eyes.



**Figure 2.** Patient 2 retina scan, A: Before – Proliferative diabetic retinopathy with vitreous hemorrhage; B: After – Right eye resolved vitreous hemorrhage.



**Figure 3.** Patient 3 retina scan, A: Before – Cystoid macular edema; B: After – Resolved cystoids macular edema with few cystic spaces.

### 3. Discussion

The medication administered to three patients comprised of Gudmar, Amalki, Haridra extract which are known to prevent microvascular and macrovascular complications. Additionally, Daruharidra is antihyperglycemic and reduces glucose resistance [3, 6, 7]. The low carbohydrate diet followed by the patients was a diet enough energy required [8-10]. The low carbohydrate diet provides sufficient amount of energy but reduced insulin production thereby leading to fats and proteins usage for energy source in absence of carbohydrates. This gradually reduces the weight. [5, 8]. Also, we observed average HbA1C (glycatedhaemoglobin) level among three patients with diabetic retinopathy was 9.2% before treatment vs. 6.5% after treatment. Studies have shown that each 1% increase in HbA1c level above 7% increases the chance of the incidence of progression to proliferative diabetic retinopathy by 50%. and development of diabetic macular edema increases by 40%. Conversely, if you reduce your HbA1c by 1% when it's elevated, chance of diabetic macular edema is reduced by 40%.

The goal of Ayurvedic Samshodhana Chikitsa (Bio-cleansing therapy), which includes Panchakarma treatment, is to remove toxic substances from the body and consequently improve immunity. Panchakarma therapy removes disease causing elements and preserve the balance of Doshas thereby increasing the body's tolerance to various therapeutic regimens [3, 5, 8]. Carbon dioxide and other volatile chemicals are expelled from the body through the lungs. Sweat and other body can remove water soluble impurities but liver can only eliminate minor part of fat-soluble harmful substances. Therefore, hazardous

fat-soluble substances build up in the body which can be eliminated using oil/ghee in Panchakarma processes [9-11]. A complication of long-term uncontrolled diabetes caused by defective metabolism and endocrine dysfunction, diabetic retinopathy affects the retina. Rakata (being both a dosha and a dushya) affects all three doshas, particularly vata, pitta, rakta, and kaphaanubandha. The significance of an integrated strategy in healthcare is emphasized by this study. Given the benefits of Ayurvedic treatments, joint research is required to produce evidence for the treatment of DR on a bigger scale [12-14].

### 4. Conclusion

Diabetic Retinopathy is preventable through glycemic control, healthy lifestyle, eating habits, and annual dilated eye examination by an ophthalmologist. All Ayurvedic treatments of panchakarma were found to be clinically safe and very effective as no adverse events or drug reactions were noticed during the course of therapy. A larger randomized control trial is warranted to generalize the findings of current study.

### Conflicting Interest

The authors declare that they have no competing interests.

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