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# FUNDUS FINDINGS OF DIABETIC RETINOPATHY

Ophthalomology

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## ABSTRACT

**Purpose -** to study the fundus findings in patients of diabetes mellitus. **Methods -** This was a prospective observational study that involved 60 eyes of 30 patients with diabetes mellitus complaining of diminution of vision. Complete ophthalmic examination was done in diffuse light followed by direct opthalmoscopic examination. **Results -** There were 12 females and 18 males .Fundus findings in patients of diabetes mellitus include microaneurysms in 93% patients followed by retinal haemorrhages in 70% patients , exudates in 63% patients, cotton wool spots in 66% patients, venous beading in 30% patients and new vessels on the disc-NVD in 04% patients, new vessels elsewhere-NVE in 06% patients and tractional retinal detachment(RD) in 1.6% patients. Patients were classified into various stages of diabetic retinopathy as per the American Academy of Ophthalmology guidelines70% patients were with mild NPDR changes, 30% with moderate NPDR changes, 20% patients with severe NPDR changes, 10% patients with PDR changes and 1% with Advance diabetic eye disease. **Conclusion-**All the patients with diabetic retinopathy had poor vision with fundus findings like microaneurysms, retinal haemorrhages, exudates, cotton wool spots, venous beading, new vessels on the disc –NVD, new vessels elsewhere-NVE, tractional RD.

## KEYWORDS

microaneurysms, retinal haemorrhages, NVD, NVE, RD

## INTRODUCTION

Diabetic retinopathy (DR) is a major complication of diabetes mellitus (DM), which remains a leading cause of visual loss in working-age populations. The diagnosis of DR is made by clinical manifestations of vascular abnormalities in the retina. Clinically, DR is divided into two stages: non-proliferative diabetic retinopathy (NPDR) and proliferative diabetic retinopathy (PDR). NPDR represents the early stage of DR, wherein increased vascular permeability and capillary occlusion are two main observations in the retinal vasculature. During this stage, retinal pathologies including microaneurysms, hemorrhages and hard exudates can be detected by fundus photography although the patients may be asymptomatic. PDR, a more advanced stage of DR, is characterized by neovascularization. During this stage, the patients may experience severe vision impairment when the new abnormal vessels bleed into the vitreous (vitreous hemorrhage) or when tractional retinal detachment is present. The most common cause of vision loss in patients with DR is diabetic macular edema (DME). DME is characterized by swelling or thickening of the macula due to sub- and intra-retinal accumulation of fluid in the macula triggered by the breakdown of the blood-retinal barrier (BRB) [1].DME can occur at any stage of DR and cause distortion of visual images and a decrease in visual acuity. Many systemic features of diabetes influence DR. For example, hyperglycemia is inextricably linked to DR as evidenced by seminal large-scale clinical trials. The Diabetes Control and Complications Trial (DCCT) for T1D [(2)] and the United Kingdom Prospective Diabetes Trial (UKPDS) for T2D [(3)] support intensive glycemic control, as assessed by hemoglobin A1c (HbA1c), to delay initiation and progression of this complication. Current treatment strategies for DR aim at managing the microvascular complications, including intravitreal pharmacologic agents, laser photocoagulation and vitreous surgery. Intravitreal administration of anti-VEGF agents is currently the mainstay of therapy for both early and advanced stages of DR. While the conventional laser therapy only provides stabilization of visual acuity, anti-VEGF therapy can result in visual improvement with less ocular adverse effects. However, according to the Diabetic Retinopathy Clinical Research Network (DRCR.net) study (Protocol I), ≥3-line improvement in best-corrected visual acuity (BCVA) was achieved in only 29% of DME patients receiving two years of anti-VEGF treatment [4].

## MATERIAL AND METHOD

This was a prospective observational study that involved 60 eyes of 30 patients with Diabetes mellitus complaining of diminution of vision. Patients were recruited from the OPD of MLB MEDICAL college, Jhansi , Uttar Pradesh and were followed from 1st February 2022- 1st August 2022 . It was performed under the Helsinki Declaration of 1975, as revised in 2000. The necessary permission from the Ethical and Research Committee was obtained for the study.

### Inclusion Criteria

1. All patients who presented to the OPD of MLB medical College Jhansi with the complaint of diminution of vision and known case of Diabetes Mellitus were included.

### Exclusion Criteria

1. Patients with ocular systemic diseases(like Hypertension) that could affect the retina.
2. Patients with other retinal disorders .
3. Patients with recent intraocular surgery .
4. Patients with the history of trauma.

All patients were subjected to a detailed history taking, refraction using Topcon autorefractometer and best corrected visual acuity (VA) measurement. All patients had complete ophthalmic examination including biomicroscopic slit lamp examination , fundus examination with 90D lens and fundus photography and optical coherence tomography.

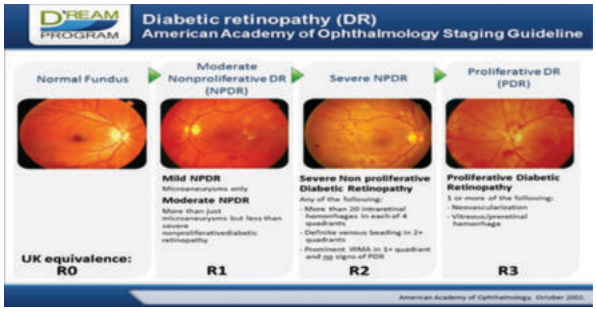


**Image I : Diabetic Retinopathy- American Academy Of Ophthalmology Guideline.**

## RESULTS

A total of 60 eyes of 30 patients were studied. We included eyes with complaint of diminution of vision. There were 18 males and 12 females . All eyes had one or more features typical of Diabetic retinopathy (microaneurysms, retinal haemorrhages, exudates, cotton wool spots, venous beading, new vessels on the disc –NVD, new vessels elsewhere-NVE,tractional RD) .

**Table I : Fundus Findings In Patients Of Diabetes Mellitus**

| Features | Total(%) |
|---|---|
| microaneurysms | 93% |
| retinal haemorrhages | 70% |

| | |
|---|---|
| exudates | 63% |
| cotton wool spots | 66.% |
| venous beading | 30% |
| new vessels on the disc –NVD | 6% |
| new vessels elsewhere-NVE | 10% |
| Tractional RD | 1.6% |

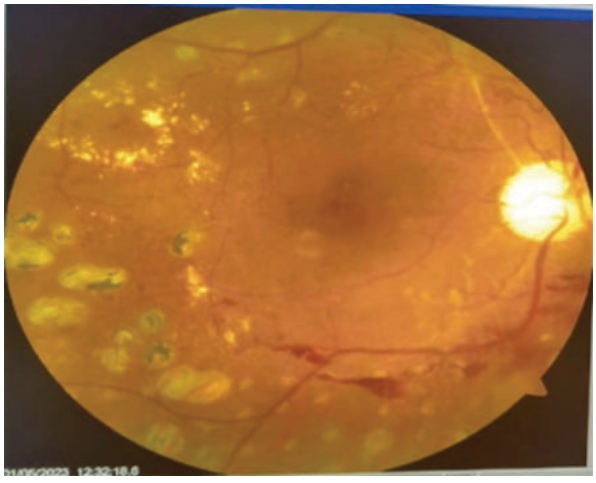

**Image II : Fundus Picture Of Right Eye Of A Patient Showing Microaneurysms, Multiple Haemorrhages, Exudates, Laser Burn Shots In The Periphery**

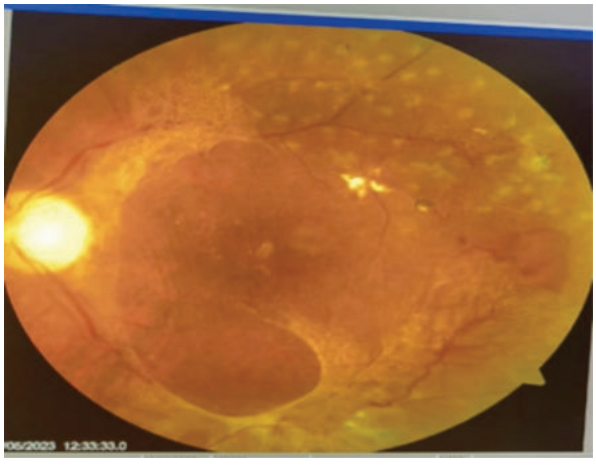

**Image III : Fundus Picture Of Left Eye Of A Patient Showing Microaneurysms, Exudates, Tractional RD And Multiple Laser Burn Shots In The Periphery**

**Table II : Severity Of Diabetic Retinopathy In Patients**

| Severity | Total(%) |
|---|---|
| No Retinopathy | 6% |
| Mild NPDR | 70% |
| Moderate NPDR | 30% |
| Severe NPDR | 20% |
| PDR | 10% |
| Advanced Diabetic eye disease | 1% |

## DISCUSSION

Diabetic retinopathy is caused by prolonged high blood glucose damaging the small blood vessels of the retina,[5] though the mechanism by which this occurs is unknown.[6] Progression of diabetic retinopathy is accompanied by loss of capillary cells, increased blood vessel permeability in the retina, and altered retinal blood flow, all of which can reduce the amount of blood oxygen that gets delivered to the retina.[7] Poor oxygenation of tissues drives the formation of new blood vessels throughout the retina, resulting in the proliferative stage of disease.[7] These new blood vessels tend to rupture easily, causing bleeding within the eye, scarring, and damage to the retina or macula.[7] A Long-standing mystery in DR and other ischemic retinopathies is the striking lack of revascularization of ischemic retina, despite the strong hypoxia stimulus and enhanced production of proangiogenic growth factors. Indeed, the diabetic milieu within the retina seems to be unfavorable for reparative angiogenesis, possibly due to pathogenic factors such as AGEs (8). As a result, anti-VEGF treatments have emerged as an effective approach for treatment of this condition (9, 10), although many additional proangiogenic pathways will likely also serve as therapeutic targets, including placental growth factor (11), stromal-derived factor-1 (12), and erythropoietin (13).Intraocular treatment modalities for diabetic eye disease include laser photocoagulation, intravitreous injections of anti-VEGF and steroid agents, and vitreoretinal surgery. Current therapeutic paradigms focus on treatment of advanced disease, once PDR or DME has developed. Panretinal photocoagulation (PRP) for PDR was first proposed in the 1960s. Despite initial skepticism that the creation of thermal burns throughout the retinal periphery could promote regression of retinal neovascularization, the efficacy of PRP in reducing rates of severe vision loss in eyes with PDR was quickly and incontrovertibly demonstrated by the nationwide, multicenter Diabetic Retinopathy Study (14). The ETDRS subsequently revealed that a milder focal/grid laser treatment applied to the central retina reduced rates of moderate vision loss in eyes with DME by 50% over 3 years (15).

## RESULTS

Individuals with Diabetes mellitus have characteristic vascular changes , vascular damage , glial dysfunction including muller cell swelling, neuronal damage, activated neuroglia, retinal pigment epithelium (RPE) damage and choriocapillaries thinning leading to diabetic retinopathy features. There is dysfunction of outer and inner blood-retinal barrier , with resulting accumulation of fluid in the retina which can be manifested by thickening of retinal cell layers, cysts and subretinal fluid. Thus, OCT may be useful to document diabetic retinopathy and its severity. Periodic ophthalmic examination should be done and strict blood sugar monitoring and control should be done to control the progression of diabetic retinopathy.

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