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Research Paper

Ocular Chorioretinal Manifestations in Patients with Diabetes Mellitus in a Tertiary Care Hospital

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Abstract
Background: *Retinal disease is one of the risk factor for complications leading to increased mortality in patients with diabetes mellitus. Choroid and vitreoretinal affectios of the eye are varied in diabetes mellitus and is the prime cause for new blindness and visual disability especially in young, working age group individuals.*
Materials and Methods: *The study is a hospital- based , non- interventional,cross-sectional prospective study. The ocular disorder are evaluated in 500 patients attending Ophthalmology out patient department of Kanyakumari govt medical college hospital. Estimation of visual acuity, anterior segment examination, slit lamp examination, intraocular pressure, retinoscopy & fundus examination, visual field analysis , gonioscopy are done to detail the defective vision.*
Results analysis: *The common pathological changes in the posterior segment causing defective vision are diabetic retinopathy- 94 patients (18.8%), Combined retinopathy- 10(2%). Other manifestations include retinal detachment, age related macular degeneration, vitreous hemorrhage, macular hole, branch retinal vein occlusion, branch retinal artery occlusion, chorioretintis, optic atrophy.*
Conclusion: *The ocular manifestation commonly associated with diabetes mellitus is retinopathy which can be modified by preventive measure and screening procedures. Early detection and prompt treatment is important to ensure quality vision.*
Key words: *Diabetes Mellitus, Retinopathy, Choroidal & vitreoretinal lesions, Visual disability.*

I. INTRODUCTION

Retina is the gift of sight, most beautiful and unique tissue in nature. It supplies 80% sensory input to the brain, most metabolically active structure and vulnerable target for microvascular disease. Retina is the only place in the body where blood vessels of the arteriolar level are visible, window for inspecting part of central nervous system and cardiovascular system, thus reflecting vascular changes in diabetes and hypertension.

Recent studies from WHO indicate that 19% of worlds diabetic population lives in India. Data relating to the alarming increase in the prevalence of Type 2 diabetes in children and adolescents has been reviewed. Although people with diabetes are at increased risk for development of cataract and glaucoma, retinopathy is the most common pattern of eye disease afflicting virtually all the spatients.

As a consequence of its microvascular pathology, diabetes mellitus is now the leading cause of new blindness in people of working age group. The incidence of blindness is 25 times higher in patients with diabetes than general population. With the launch of 'Vision 2020' global initiative, the focus has shifted to all causes of preventable blindness as retinopathy. Efforts should be made to recognize and treat those affected, at an early stage, for the benefit of the individual and the society.

II. MATERIALS AND METHODS

Study design - The present study is a hospital-based, non-interventional, cross- sectional prospective study. The study population consists of 500 diabetic patients (age group 30–70 years) attending Ophthamology outpatient department in Kanyakumari Govt Medical College Hospital.

Ophthalmic examination:

Visual acuity testing– The presenting distant visual acuity for both eyes is measured seperately using a standard Snellen's chart properly illuminated at a distance of 6m. Each participant had an anterior segment examination, using a torch, to detect the signs of conjunctival and corneal diseases. Slit lamp examination of cornea was done to determine the position, depth and site of corneal abnormality and lens opacities .

Recording of intraocular pressure– Schiotz indentation tonometer was used to record the intraocular pressure of the anaesthetized cornea. Visual field analysis-- done using automated static perimeter (for selected cases) Retinoscopy was performed after pupillary dilatation to elicit the refractive status of the eye. Fundus examination was carried out using direct ophthalmoscope. Gonioscopy– to determine the type of angle in the anterior chamber of the eye (selected cases)

The following definitions are used for the study :

Diabetic Retinopathy is classified according to the Early Treatment of Diabetic Retinopathy Study (ETDRS) criteria. It is classified into non-proliferative (NPDR) and proliferative diabetic retinopathy (PDR). NPDR is further subdivided into mild, moderate, and severe. Diabetic macular edeme is classified into clinically significant (CSME) and clinically non significant.

All the participants of this study had the following tests done. Estimation of blood sugar and serum cholesterol- blood samples are collected and sent to the Biochemical laboratory, Kanyakumari Govt Medical College Hospital and the reports collected.

III. RESULTS ANALYSIS

Table – 1: Distribution of subjects by age and sex

Age group (years)	Male	Female	Total
30- 40	15	30	45
41-50	53	42	95
51-60	86	84	170
61-70	112	78	190
Total	266	234	500

Among 500 diabetic patients examined, 266 are men and 234 are women.

Table – 2: Association of choroidal , vitreous & retinal diseases in diabetes

Retinal Diseases	Female	Male	Total no: of cases	Prevalence %
Vitreous opacities	1	2	3	0.6
Vitreous hemorrhage	3	7	10	2
Diabetic retinopathy	34	60	94	18.8
Branch retinal vein occlusion	-	3	3	0.6
Branch retinal artery occlusion	-	1	1	0.2
Combined retinopathy	5	5	10	2
Retinal detachment	1	4	5	1
Macular hole	3	1	4	0.8
Chorioretinitis	1	1	2	0.4
Age related macular degeneration	5	3	8	1.6
Optic atrophy	1	4	5	1
Total	54	91	145	29

Diabetic patients presenting with choroidal and vitreoretinal lesions were 145 (54 women, 91 men) and the prevalence is 29%. Retinopathy is found to be the most common retinal diseases - 18.8%

Table 3: Various stages of retinopathy in diabetes mellitus

Diabetic retinopathy	Total no: of cases	Prevalence %
NPDR Mild	22	4.4
Moderate	38	7.6
Severe	11	2.2
PDR	23	4.6
Total	94	18.8
NPDR/ PDR with CSME	17	3.4

The prevalence rate of NPDR is 14.2% , PDR is 4.6% and CSME 3.4%.

Table – 4: Distribution of retinopathy in relation to duration of diabetes

Duration of diabetes (years)	No: of subjects	Diabetic retinopathy	Prevalence %
0 – 5	162	13	8
5 – 10	130	24	18
10 – 15	110	25	22
15 – 20	98	32	32

As the duration of diabetes increases, the percentage of cases of retinopathy also increases.

IV. Discussion

The 500 diabetic patients selected for this study were examined thoroughly for visual disorders in the posterior segment. Out of them 13 patients were diagnosed to have vitreous pathology. **Vitreous opacities - asteroid hyalosis** (0.6%) is a unilateral condition, diabetes is a risk factor, consists of complex lipids embedded in an amorphous matrix containing calcium and phosphorus attached to vitreous framework & typically moves with eye movement. The prevalence rate and the findings in our study correlates with that of Bergren RC et al.[1] **Vitreous hemorrhage** (2%) into the subvitreal space is due to neovascular growth & fibrovascular tissue contraction, common in diabetic patients. Blood completely fills the eye and blocks the view of retina, takes weeks to months to clear (Butner RW et al).[2]

132 patients with defective vision were found to have retinal and choroidal lesions. Hyperglcemia is the primary cause of microvascular complications – oxidative stress within endothelial cells of retina & glycosylation of tissue proteins plays a major role. The various manifestations among diabetics in our study are diabetic retinopathy (18.8%), combined retinopathy(2%), branch retinal vein occlusion (0.6%), branch retinal artery occlusion (0.2%), retinal detachment (1.6%), macular hole (0.8%), chorioretinitis (0.4%), age related macular degeneration (1.6%) and optic atrophy (1%).

Diabetic retinopathy– NPDR is characterized by retinal small vessel occlusion and increased permeability due to loss of blood retinal barrier.[3] Various fundus changes include hemorrhage,cotton wool spots, intraretinal microvascular abnormalities(IRMA) & venous abnormalities. In PDR, neovascularisation and associated hemorrhage, scarring and retinal detachment occurs.[4] Proliferation of new vessels occur in response to vasogenic factors released by ischaemic retina. Macular edema is due to extravasation of plasma proteins across abnormally leaky capillaries. The prevalence of diabetic retinopathy 18.8% in our study is similar to that of CUPS study [5] & prevalence of CSME 3.4% is similar to studies by Rema M et al in India.[6] The incidence of diabetic retinopathy is also found to increase with the length of time the patient had diabetes; 8% with duration 0 to 5 years to 32% with duration 15-20 years. Similar findings have been reported by Klein R et al.[7] We find that poor control of diabetic status in our study participants to be associated with diabetic retinopathy. Various case control studies - DCCT, UKPDS[8], Kumamoto [9] have proved the importance of tight glycemic control and blood pressure control in the prevention of microvascular complications of diabetes mellitus. Specific treatment as laser photocoagulation, vitreoretinal surgery can restore useful vision to severely impaired eyes.

Combined retinopathy - Among 185 diabetic subjects with hypertension, 73 presented with diabetic retinopathy & 10 had both hypertensive and diabetic retinopathy. The retinal changes mirror the systemic circulation and its severity correlates well with the development of systemic complications of hypertension and with survival.[10] There is vasospastic reaction to an acute pressure rise and arteriosclerotic response to chronic elevation. Pathological ocular findings include optic nerve edema, cotton wool spots, hemorrhage, intraretinal lipid – macular star configuration, and focal infarcts.[11] Treatment with antihypertensives can halt the progression of retinal changes.

Branch retinal vein occlusion - seen at superotemporal branch vein, at arteriovenous crossing point, vein sandwitched between the artery and the retina.[12] Abnormalities of blood constituents may promote thrombus formation.[13] These subjects had elevated blood pressure and were found to be associated with increased risk for BRVO.[14] Antihypertensives & laser photocoagulation therapy is beneficial in them. Regular prophylactic aspirin is prescribed to have protective effect against arterial occlusion in the other eye and against stroke. Laser treatment helps to reduce macular edema and improve visual acuity (Mc Allister IL et al)[15]

Branch retinal artery occlusion – diagnosed in diabetic patient with right eye affection reflects the greater possibility of cardiac or aortic emboli travelling to right carotid artery, similar findings has been suggested by Sanborn GE et al.[16] Fundus shows areas of superficial retinal whitening in the distribution of the temporal vessels, due blockage of axoplasmic flow in the nerve fiber layer. No proved treatment exists and about 80% of eyes recover to 6/12 or better central acuity.

Retinal detachment - The hypoxic retina elaborates an angiogenic factor that induces neovascularisation.

Contractile membranes thus grow across the retina in proliferative diabetic retinopathy and later shrinkage of the fibroglial tissue leads to tractional retinal detachment [17]. Treatment consists of reduction of traction by banding, buckling, scleral resection or vitrectomy.

Macular hole - presenting in a female subject[18], a unilateral condition , occurs due to the shrinkage and traction of vitreous in front of the macula, causing loss of central vision (Kokame GT).[19] Surgical removal of the vitreous and closure of hole by gas tamponade results in improvement of sight.

Age related macular degeneration - Hemodynamic alteration in the choroidal circulation is an important pathophysiological mechanism.[20] Drusen is deposited between retinal pigment epithelium (RPE) and Bruch's membrane and there is atrophy of RPE cells and degenerative change in photoreceptor outer segments at the macula. Various researchers have implicated atherosclerosis, oxidative damage, phototoxicity, inflammation, genetics & diet as risk factors. The prevalence of ARMD 1.6 % in our study is similar to Netherlands study by Vingerling JR et al. [21] Taking a high dose of antioxidant vitamin and mineral combination gives limited benefit and modifies progression in high risk patients. Subjects should be made aware of the importance of regular central visual acuity testing for early diagnosis. Laser therapy, refraction and low vision aids are useful in maximizing remaining visual function and perform activities of daily living.

Chorioretinitis diagnosed in 2 subjects is the end result of chronic infective or inflammatory response to a systemic illness. **Optic atrophy** in 5 subjects results from arterial blood flow insufficiency, that occurs as a sequele of severe ischaemia, common in diabetic patients (Murthy GG 2003).[22]

IV. CONCLUSION

The present study has been carried out to provide information on the ocular chorioretinal disorders that are prevalent among diabetic patients.The most common retinal disease causing visual disability is diabetic retinopathy & the prevalence 18.8% in our study is similar to The Chennai Urban Population Study by Rema M et al.

Preventing sight threatening retinopathy from developing and progressing is considered the best approach to preserve vision. Thus ocular screening procedures along with tight control blood glucose, blood pressure and hyperlipidemia in younger age group individuals can reduce the progression of diabetic retinopathy. The newer diagnostic ophthalmic imaging technique optical coherence tomography (OCT) quantifies retinal thickening & is the objective method of choice currently. The most serious threat to vision is diabetic macular edema and proliferative retinopathy which are treatable by laser therapy. Intraocular surgery may be done for patients with vitreous hemorrhage and retinal detachment of the macula. Low-vision rehabilitation for visually disabled should be an integral part of comprehensive eye care for diabetics.

Diabetes mellitus is a stress-related, modern, lifestyle disease which can be prevented by suitable stress- relaxation techniques, healthy diet and aerobic exercise. Early detection, careful follow-up and prompt treatment are key stages in the successful management of diabetic retinopathy so that deterioration of visual function can be avoided. By these means vision can be preserved for a better living condition.

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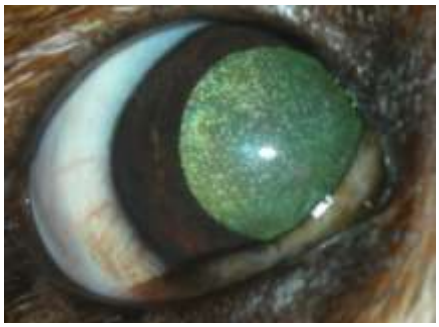
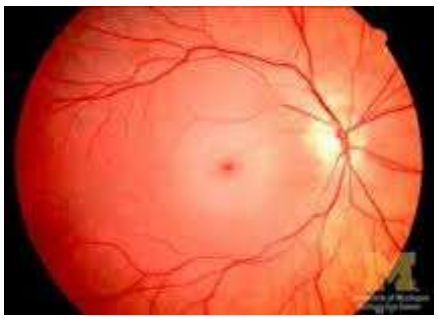
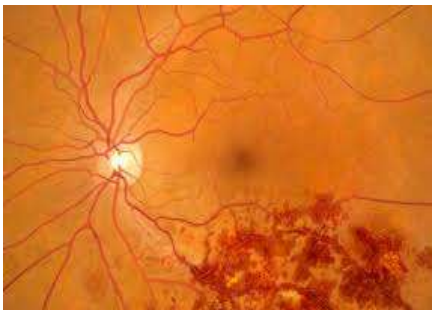


(i)Asteroid hyalosis

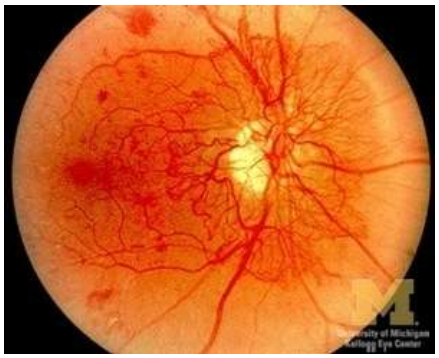
(ii) Age related macular degeneration



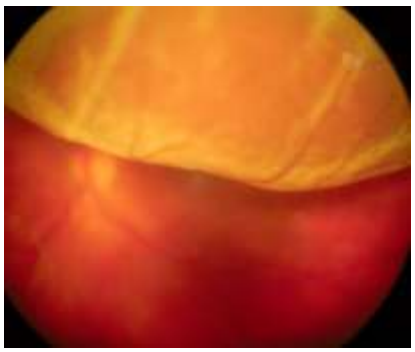
(iii) Branch retinal artery occlusion



(iv) Branch retinal vein occlusion



(v) Diabetic retinopathy



(vi) Retinal detachment