



Research Paper

Incidence of Glaucoma & Diabetic Retinopathy in Patients with Diabetes Mellitus in A Teaching Hospital

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ABSTRACT

Background: Vision is a means of communication of man with the external world. The impact of visual loss due to various ocular morbidities has profound implications for the person affected and the society as a whole. Diabetes has become one of the world's most important public health problems & WHO indicate that 19% of world's diabetic population lives in India. Diabetes related microvascular complications cause visual disability even in younger age group individuals.

Aim: To estimate the magnitude of Glaucoma and diabetic retinopathy in diabetic patients in our institution. To create awareness about avoidable blindness in diabetic patients. To enlighten and thereby motivate the patient for further evaluation and follow up.

Materials and methods: The study is a hospital-based, non-interventional, cross-sectional study. The ocular disorders are evaluated in 500 consecutive diabetic patients attending ophthalmology out patient department of Kanyakumari medical college hospital. Estimation of visual acuity, slit lamp examination, intraocular pressure, retinoscopy & fundus examination, visual field analysis, gonioscopy are done to detail the defective vision.

Result analysis Data is analysed using SPSS. The common manifestations are cataract- 346 (69%), diabetic retinopathy- 94 patients (18.8%), glaucoma- 34 (6.8%). Patients with cataract are well managed by cataract extraction techniques. Prime importance is to create awareness and also diagnose the early changes of retinopathy and glaucoma. Treatment of glaucoma if instituted early will go a long way in preventing avoidable blindness. Therefore periodic visual screening along with control of hyperglycemia and associated risk factors is needed to ensure good quality of vision.

Keyword: glaucoma, diabetic retinopathy, funduscopy, tonometry, visual acuity

I. INTRODUCTION

With modern life style in the present environmental conditions and with the advent of automobile, entertainment facilities along with the availability of easy access to junk food, the prevalence of obesity and related metabolic syndrome is high.¹ Globally there was an estimated 19.4 million diabetes individuals in 1995 which is projected to increase to nearly 80 million in 2030.² The metabolic dysregulation associated with diabetes causes secondary pathophysiologic changes in all the structures of the visual apparatus. The complications associated are cataract, glaucoma, diabetic retinopathy, retinal vascular occlusions and extraocular muscle palsies. The incidence of blindness is 25 times higher in patients with diabetes than in the general population.³ Diabetic eye disease is the leading cause of new blindness in people of working age group. India has been the first country in the world to initiate a public funded program for the control of blindness as a national priority health problem. With the launch of 'Vision 2020' global initiative, the focus has shifted to rapid assessment and management of all causes of avoidable blindness.⁴ 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 consecutive diabetic patients attending ophthalmology out-patient department in Kanyakumari Govt Medical College Hospital. Institutional Ethical committee approval is obtained and study conducted for a period of 6 months. Informed consent is obtained from all the selected individuals, who fit into the criteria. By way of providing proforma, the required data is collected.

Inclusion criteria- 500 consecutive diabetic patients in the age group 30–70 years. Exclusion criteria- Patients with acute injury to eye, Previous surgeries like keratoplasty or RD surgery Ophthalmic examination:

Visual acuity testing– The presenting distant visual acuity for both eyes is measured separately 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 to determine the position, depth and site of corneal abnormality and lenticular opacities was done. Recording of intraocular pressure– Schiottz indentation tonometer and applanation 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 and indirect ophthalmoscope. Gonioscopy– to determine the type of angle of the anterior chamber of the eye (selected cases)

The Following Definitions Are Used For The Study :

1. Glaucoma: An intraocular pressure of more than 21 mm Hg associated with optic disc cupping and / or visual field defects.

2. Cataract: was defined as the presence of lens opacity of such magnitude as to cause a corrected visual acuity of <6/18

3. 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 edema is classified as DME and is clinically significant as CSME .

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

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 common ocular diseases in diabetic patients

Ocular disease	Total no: of patients	Percentage
Glaucoma	34	6.8
Cataract	346	69
Refractive errors	78	15.6
Vitreous & Chorioretinal	145	29

The most common ocular manifestation in diabetes is cataract, followed by chorioretinal disorders, refractive errors and glaucoma.

Table - 3: Various stages of retinopathy in diabetes mellitus

Diabetic retinopathy	Total no: of patients	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 various types of glaucoma in diabetic subjects

Type of glaucoma	Total no: of cases	Prevalence %
Primary open angle glaucoma (POAG)	29	5.8
Primary angle closure glaucoma (PACG)	1	0.2
Neovascular glaucoma	1	0.2
Phacomorphic glaucoma	1	0.2
Phacolytic glaucoma	2	0.4
Total	34	6.8

Primary open angle glaucoma is found to be the most common type of glaucoma with a prevalence of 5.8%

IV. DISCUSSION

The 500 diabetic patients with the complaints of loss of vision selected for this study were examined thoroughly for ocular cause. Cataract, glaucoma, diabetic retinopathy are the major causes of visual impairment in diabetic patients. Cataracts are important with regard to visual impairment and because they hinder visualization of the posterior segment. Better visualization of the posterior segment is essential for both documentation and treatment such as LASER and Vitreo Retinal surgery. 346 patients had visual impairment due to **cataractous lens**. Cataracts diagnosed in diabetic patients are graded as cortical (41%), nuclear cataract (39%) & posterior sub-capsular cataract (19%) as per “The Lens Opacities Classification System, version II (LOCS). The lens in diabetics matures more rapidly than normal. Thus, a diabetic lens has the appearance of a normal lens about 15 years older. This explains the increased incidence of senile cataract in diabetics because it is just a reflection of more rapid senescence.¹ In the Beaver Dam Eye study, persons with older onset diabetes were significantly more likely to have cortical lens opacities or earlier cataract surgery than persons without diabetes in the same age group.²

34 diabetic patients were found to have elevated intraocular pressure (IOP) & were diagnosed to have **glaucoma**. Glaucoma can be defined as a chronic progressive optic neuropathy associated with typical optic nerve head changes, visual field effects in which elevated intraocular pressure is a major risk factor. Diabetic patients are at risk for two major types of glaucoma, primary open angle glaucoma and neovascular glaucoma

Several studies have shown a high prevalence of POAG in patients with diabetes and vice versa. These include Blue Mountain Eye Study, Rotterdam Study³ and the Beaver Dam Study in Wisconsin⁴. The explanation being Diabetes affects the small blood vessels supplying the optic nerve, thereby rendering it more susceptible to glaucomatous damage. Diabetes also impairs the auto regulation of posterior ciliary circulation which can aggravate the glaucomatous damage. In addition coexisting hypertensive and cardiovascular diseases may affect vascular perfusion of the optic nerve head. Diabetes may be associated with PACG due to systemic autonomic dysfunction or increased lens thickens due to sorbitol accumulation. Amstrong JR et al has reported that the Primary open angle glaucoma is 1.4 times more common in the diabetic population than in the non-diabetic population. Primary open angle glaucoma (POAG) diagnosed in 29 subjects was the commonest type noted in our study. The higher prevalence of POAG 5.8% among diabetics in our study coincides with that reported by Mitchell P et al.⁵ Management is to lower IOP, to a safe target level, for that particular patient. One case of Primary angle closure glaucoma (PACG) that is bilateral, asymmetrical, presenting in a 60 year female subject (Salmon JF et al).⁶ It is characterized by apposition of the peripheral iris against the trabecular meshwork resulting in obstruction of aqueous outflow (Mapstone R).⁷ It is important to do a prophylactic peripheral iridectomy in the fellow eye of patients who have angle closure glaucoma with a pupillary block component. The prevalence percentage 0.2% among diabetics is similar to that reported by Quingley HA et al.⁸

One case of neovascular glaucoma as noted in our study corresponding to a percentage of 0.2%. Diabetes is one of the commonest causes for NVG accounting for a third of the cases. Usually seen in cases of proliferative Diabetic retinopathy, and in NPDR if there are extensive areas of capillary Non perfusion. Rubeosis iridis occurs in approximately 1-17% of the diabetic eyes and in 33-64% in eyes with proliferative diabetic retinopathy. Clearly the prevalence of Rubeosis iridis is much higher than the prevalence of Neovascular glaucoma. This Rubeosis may progress to NeoVascular Glaucoma, remain stationary or regress. The rate of progression is much lower if retina is treated with panretinal photo coagulation. The prevalence of Neovascular glaucoma is related to the duration of diabetes and associated diseases. Phacolytic glaucoma is a form of open angle glaucoma associated with hypermature cataractous lens.⁹ This condition should be handled as an emergency, ultimately by removal of the lens after IOP control. In Phacomorphic glaucoma an intumescent lens through pupillary block and iris bombe, leads to peripheral anterior synechiae and secondary angle closure. Treatment is cataract extraction after lowering IOP. The overall incidence of glaucoma among diabetics 6.8% in our study is similar to that reported in Maharashtra by Sheetal Dharmadhikari et al. Successful management aims to lower IOP either by laser therapy, medical or surgical intervention to a ‘target pressure’ below which further optic nerve damage is unlikely.

135 patients with defective vision were found to have vitreous, retinal and choroidal lesions. Diabetic Retinopathy occurs roughly in 10.3%. Majority of type II diabetes mellitus and all of type I diabetes

mellitus are likely to develop Diabetic Retinopathy in their lifetime.¹⁰ The prevalence of diabetic retinopathy was estimated and its association with duration of diabetes, type of diabetes, gender, insulin usage and associated conditions like hypertension, hyperlipidemia were studied. Diabetic Retinopathy is predominantly classified into NPDR, Nonproliferative Diabetic Retinopathy and proliferative Diabetic Retinopathy [PDR].¹¹

Diabetic retinopathy–NPDR is characterized by retinal small vessel occlusion and increased permeability due to loss of blood retinal barrier. Various fundus changes include microaneurysms, hemorrhages (superficial and dot blot hemorrhages), cotton wool spots, intraretinal microvascular abnormalities (IRMA) & venous beading. In PDR, neovascularisation and associated intra/preretinal hemorrhages, scarring and retinal detachment occurs. 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 study¹² & prevalence of CSME 3.4% is similar to studies by Rema M et al in India.¹³ The prevalence in the AIOS Study was however 21.27%. 78 diabetic patients had significant refractive errors in our study. The rapid rise in blood glucose levels may induce a marked myopia, the rapid reduction of blood glucose level to normal may induce a marked hyperopia and the return of the normal refractive ability of the eye may require several weeks. Diabetic persons frequently demonstrate presbyopia at an earlier age than non-diabetic persons, and the loss of accommodative ability frequently progress more rapidly for diabetic persons. Suitable refractive correction has to be given for the subjects.

V. CONCLUSION

The present study has been undertaken to highlight & also increase the awareness of visual disorders prevalent among diabetic patients. Cataract (69%), glaucoma (18.8%), retinopathy (6.8%) are the most common eye manifestations in diabetes mellitus. The awareness being more with cataract compared to glaucoma and retinopathy. It has been well noted from our study that patients with prolonged duration of diabetes, poor glycemic control, had an increased risk of development of vision threatening complications. It is also apparent that dyslipidemia, smoking & hypertension are additional risk factors. Awareness about the complications will therefore enable earlier detection esp. in younger age group and this in turn will help in preserving vision in the long run for a better living condition.

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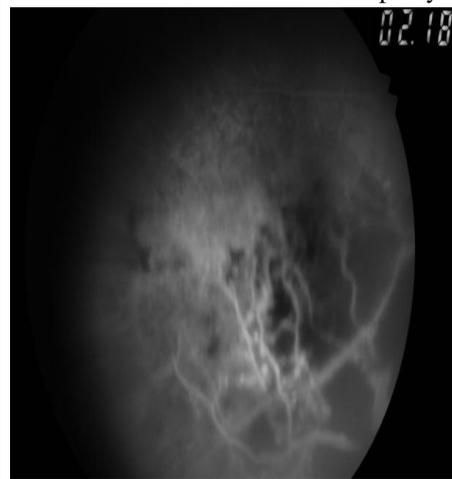
Non proliferative diabetic retinopathy



Proliferative diabetic retinopathy



Primary Open Angle Glaucoma



Fundus Fluorescein Angiography



Anti glaucoma valve implant



Post operative bleb