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ORIGINAL ARTICLE

Prevalence of diabetic retinopathy among diabetic patients in a tertiary hospital

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ABSTRACT

Objective

To determine the prevalence of diabetic retinopathy (DR) among Filipino patients with diabetes mellitus (DM) and determine the risk factors.

Methods

Two hundred forty-one patients from the diabetes clinic of the University of the Philippines-Philippine General Hospital (UP-PGH) were interviewed using a standard questionnaire. They underwent dilated retinal examination, stereoscopic fundus photography, fluorescein angiography, and laboratory testing. The risk factors studied for the presence of DR were age; sex; duration of DM; medications; family history of DM; smoking; blood glucose, cholesterol, and serum creatinine levels.

Results

The clinical and angiographic prevalence of DR were 61.8% and 83.6% respectively. Retinopathy was significantly associated with the duration of DM ($p = 0.02$) and elevation of serum creatinine ($p = 0.05$). Approximately 20% had proliferative disease at the time of screening. There was a high agreement between clinical and angiographic findings (*kappa* = 0.91, $p = 0.001$).

Conclusions

High prevalence of DR was seen among DM patients treated at UP-PGH. Elevated serum creatinine and longer duration of DM were significantly associated with the presence of retinopathy. Retinal screening of all newly diagnosed DM is, therefore, recommended including regular follow-up evaluation.

Keywords: *Diabetes mellitus, Retinopathy, Prevalence, Fluorescein angiography*

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DIABETIC retinopathy (DR) is a leading cause of blindness worldwide, accounting for 2% of legally blind and 10% of those with severe visual handicap, according to the World Health Organization. In the United States, it affects 50% of those with diabetes mellitus. Worldwide, the prevalence rates range from 9% to 71%, and these are expected to increase over the next 20 years.[2-10] Data on its prevalence among Filipino diabetic patients are, however, lacking.

This study determined the prevalence of DR among Filipino patients with DM, its severity, and the risk factors associated with it.

METHODOLOGY

Two hundred and forty-one patients seen at the outpatient Diabetes Clinic of the University of the Philippines-Philippine General Hospital (UP-PGH), a government-operated tertiary-care center in Metro Manila, were recruited from March to August 1999. They were interviewed using a standard questionnaire and their medical charts reviewed to obtain the following data: age; gender; family history of systemic diseases; medication and smoking history; duration of DM; and levels of fasting blood glucose (FBS), glycosylated hemoglobin, serum creatinine, and serum cholesterol. Ophthalmic evaluation included determination of the best-corrected visual acuity (BCVA), slitlamp evaluation, and a dilated-fundus examination conducted by a single retina specialist (MFFG) using noncontact biomicroscopy and indirect ophthalmoscopy. The presence and severity of DR by clinical examination was recorded. Stereo fundus photography (SP) and fluorescein angiography (FA) were performed on 147 patients and a separate assessment of the presence and severity of DR by these methods was made by a masked retina specialist (HSU). The severity of DR was classified according to the PGH Retina Service Diabetic Retinopathy Grading System (Table 1).

Informed consent was obtained from all patients. The study protocol was reviewed and approved by the Ethics Review Board of UP-PGH.

Chi-square and logistic regression were performed using SAS and Epi-Info. The kappa coefficient was computed to compare results of clinical examination, SP and FA with patient variables. A *p* value of 0.05 or less was considered significant.

RESULTS

Table 2 gives the demographic profile of the study population. The mean age of the patients was 55 years. 24.1% had a family history of DM and 27% were smokers. 30.7% of patients had DM of less than 5 years, 26.6% between 5 and 10 years, and 42.7% more than 10 years. At enrollment, 75.9% had elevated FBS, 19.6% had elevated serum creatinine, and 59.3% had elevated serum cholesterol. Sixty (39.4%) of 153 females and 21 (24%) of 88 males had DR.

61.8% of patients manifested DR on dilated-fundus

Table 1. **Philippine General Hospital Retina Service Diabetic Retinopathy (DR) Grading System.**

Grading	Diabetic-Retinopathy Findings
No retinopathy	None
NPDR[1] mild	MA[3]
NPDR moderate	MA and retinal hemorrhage < 4 quadrants Soft exudates Venous beading in 1 quadrant IRMA[4] <1 quadrant
NPDR severe	MA and retinal hemorrhage in 4 quadrants Venous beading in 2 or more quadrants IRMA in 1 quadrant
PDR[2] early	NVE[5] < 1/2 disc area NVD[6] < 1/3 disc area
PDR high risk	NVE = 1/2 disc area or more NVD = 1/3 disc area or more Preretinal or vitreous hemorrhage Fibrous proliferation Traction retinal detachment

1. Nonproliferative diabetic retinopathy
2. Proliferative diabetic retinopathy
3. Microaneurysms
4. Intraretinal microvascular abnormality
5. Neovascularization elsewhere
6. Neovascularization on optic disc

Table 2. **Demographic profile of the study population (n = 241).**

Age (years)	
Mean	56
Range	36 to 72
Male:Female	88:153 (63.5%)
With family history of DM	58
Smoker	65
Duration of DM	
< 5 years	74
5 to 10 years	64
> 10 years	103
Elevated fasting blood sugar (>6.1 mmol/L)	183
Elevated serum creatinine (>115 mmol/L)	47
Elevated serum cholesterol (>6.2 mmol/L)	143

Table 3. **Prevalence of diabetic retinopathy according to method of fundus evaluation.**

Diabetic-Retinopathy Grading	Clinical Examination (n = 241)	Stereo Fundus Photography and Fluorescein Angiography (n = 147)
No retinopathy	(85) 35.2	(22) 15.0
With retinopathy	(149) 61.8	(123) 83.6
NPDR[1] mild	(4) 16.4	(28) 18.6
NPDR moderate	(72) 29.9	(59) 40.3
NPDR severe	(21) 8.9	(7) 4.7
PDR[2] early	(1) 0.6	(16) 11.0
PDR high risk	(15) 6.1	(13) 8.6
Indeterminate	(7) 2.9	(2) 1.4

1. Nonproliferative diabetic retinopathy
2. Proliferative diabetic retinopathy

examination, 35.2% had no DR, and 2.9% had indeterminate findings due to associated ocular conditions such as dense cataract or corneal scar that precluded adequate fundus evaluation. The distribution according to severity of DR is listed in Table 3.

Of the 147 patients who underwent SP and FA, 83.6% had DR, 15.0% had no DR, and 1.4% had indeterminate findings (Table 3). Approximately 20% had angiographic evidence of proliferative disease.

More patients were diagnosed with diabetic retinopathy by SP and FA than by clinical examination alone. A high degree of agreement between clinical examination and SP and FA was observed with a kappa value of 0.91 ($p = 0.001$).

Logistic-regression analysis of age, sex, medication, family history, smoking history, fasting blood glucose, glycosylated hemoglobin, and cholesterol levels did not show significant association with DR. Duration of DM ($p = 0.02$) and serum-creatinine levels ($p = 0.04$) were significantly related to the presence of DR. Elevated serum creatinine was observed in 89 (60%) patients with DR. Among 149 patients with clinical DR, 51 (34.2%) had DM for less than 5 years, 32 (21.5%) for 5 to 10 years, and 66 (44.3%) for more than 10 years.

DISCUSSION

Diabetic retinopathy accounted for 85% of cases seen at the UP-PGH Retina Clinic and 80% of retinal surgeries (1998 Annual Report of the Department of Ophthalmology, UP-PGH). Majority had advanced disease at initial consultation.

The prevalence of DR in this series was higher compared with those of other clinic-based studies.[8-10] Underprivileged patients, which comprise the majority of patients seen at UP-PGH, have multiple barriers to receiving medical care and obtaining medication compared to private patients who have better access to health care and were more likely to seek consultation earlier. In this study, approximately 1 in 5 patients had proliferative disease at the time of enrollment and were at risk for visual loss. Many of them were unaware of having DM. A dilated retinal evaluation is, therefore, recommended for all newly diagnosed DM patients. Measures promoting early and regular screening for DR are also needed to reduce the risk of blindness.

Concordance of clinical retinal evaluation and angiographic evidence of DR was high in this study, supporting the usefulness of dilated retinal examination in screening for retinopathy. However, the angiographic rate of DR was higher (83.6%) compared to the clinical evaluation (61.8%), suggesting a higher sensitivity of FA in detecting retinopathy and the need to perform this procedure periodically.

As in other studies, the duration of DM and serum-creatinine level were significantly correlated with the presence of DR. These risk factors can be used to determine the frequency and interval of follow-up retinal evaluation.

In summary, high prevalence of diabetic retinopathy was seen among patients in a public tertiary-care center. Elevated serum-creatinine level and longer duration of DM were significantly associated with the presence of retinopathy. Dilated retinal examination should be recommended for all newly diagnosed DM patients, plus regular follow-up to detect worsening of the retinopathy. Periodic fluorescein angiography may be performed as needed to better ascertain the status of the disease.

References

1. Klein R, Klein BE, Moss SE, Cruickshanks KJ. Relationship of hyperglycemia to the long-term incidence and progression of diabetic retinopathy. *Arch Intern Med* 1994; 154: 2169-2178.
2. Kini MM, Leibowitz HM, Colton T, et al. Prevalence of senile cataract, diabetic retinopathy, senile macular degeneration and open-angle glaucoma in the Framingham eye study. *Am J Ophthalmol* 1978; 85: 28-34.
3. Klein R, Klein BEK, Moss SE, Linton KLP. The Beaver Dam Eye Study. Retinopathy in adults with newly discovered and previously diagnosed diabetes mellitus. *Ophthalmology* 1992; 99: 58-62.
4. Sparrow JM, McLeod BK, Smith TD, et al. The prevalence of diabetic retinopathy and maculopathy and their risk factors in the noninsulin-treated diabetic patients of an English town. *Eye* 1993; 7: 158-163.
5. Stolk RP, Vingerling JR, de Jong PT, et al. Retinopathy, glucose and insulin in an elderly population. The Rotterdam Study. *Diabetes* 1995; 44: 11-15.
6. Klein R, Klein BEK, Moss SE, et al. The Wisconsin epidemiologic study of diabetic retinopathy. III. Prevalence and risk of diabetic retinopathy when age at diagnosis is 30 or more years. *Arch Ophthalmol* 1984; 102: 527-532.
7. Mitchell P, Smith W, Wang JJ, Attebo K. The prevalence of diabetic retinopathy in an older community. *Ophthalmology* 1998; 105: 406-411.
8. Sjolie A, Stephenson J, Aldington S, et al. Retinopathy and vision loss in insulin-dependent diabetes in Europe. The EURODIAB IDDM Complications Study. *Ophthalmology* 1997; 104: 252-260.
9. Estrella CC, Fernando RE. Diabetic retinopathy among Filipinos: preliminary report. *Philipp J Ophthalmol* 1970; 2:18-21.
10. Estrella CC, Fernando RE. Diabetic retinopathy among Filipinos. *Philipp J Ophthalmol* 1974; 6: 95-98.