

Diabetic eye screening in Malaysia: findings from the National Health and Morbidity Survey 2006

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ABSTRACT

Introduction: Diabetic retinopathy (DR) is the commonest complication of diabetes mellitus (DM), and is the leading cause of blindness among working adults. Modification of the associated risk factors as well as early detection and treatment of sight-threatening DR can prevent blindness. Clinical practice guidelines recommend annual eye screening for patients with DM. The proportion of patients in Malaysia who adhere to this recommendation was initially unknown.

Methods: The Malaysian National Health and Morbidity Survey is a population-based survey conducted once every decade on the various aspects of health, behaviour and diseases. The DM questionnaire on eye screening was administered as face-to-face interviews with 2,373 patients with known DM who were aged 18 years and older.

Results: In all, 55 percent of patients with known DM had never undergone an eye examination. Among patients who had undergone eye examinations, 32.8 percent had the last examination within the last one year, 49.8 percent within the last one to two years, and 17.4 percent more than two years ago. A significantly lower proportion of younger patients and patients who received treatment for DM from non-government facilities had previously undergone eye examinations.

Conclusion: The prevalence of DM observed among Malaysians aged 30 and above is 14.9 percent; thus, there is a significant number of people with potential blinding DR. Adherence to eye screening guidelines and the prompt referral of sight-threatening DR are essential in order to reduce the incidence of blindness among patients with DM.

Keywords: diabetic eye screening, diabetic retinopathy

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INTRODUCTION

Diabetic retinopathy (DR) is the commonest complication of diabetes mellitus (DM), and it is also a major cause of blindness among people of reproductive age.^(1,2) The World Health Organization has reported that 4.8% of cases of global blindness were due to DR.⁽³⁾ The prevalence of different forms of DR varies among populations but ranges between 25% and 40%.⁽⁴⁾ The prevalence of sight-threatening DR was found to be 10.8% among Singaporean Malays⁽⁵⁾ and 8.2% in pooled data, based on eight population-based studies conducted in the United States of America and Australia.⁽⁶⁾ Data from the diabetic eye registry of the Ministry of Health (MOH) of Malaysia, which registers patients with DM seen for the first time at ophthalmology clinics in MOH hospitals, showed that 36.8% of patients had DR and 14.7% had sight-threatening DR.⁽⁷⁾ In one primary care setting in the southern part of Malaysia, the prevalence of DR among patients treated there was 34.7% and that of sight-threatening DR was 40.8%.⁽⁸⁾ The proportion of DR was much higher at a university ophthalmology clinic, where 51.6% of DM patients had DR.⁽⁹⁾

During the early stage of DR, visual symptoms are not apparent. When patients complain of visual symptoms, retinal damage may have already led to irreversible visual impairment. Diabetic eye screening has been shown to be cost-effective in preventing visual impairment.^(4,10) Thus, clinical practice guidelines (CPG) recommend that an initial fundus assessment be conducted at the time of diagnosis of type 2 DM or within five years after the diagnosis of type 1 DM, and annually thereafter if the retina is normal.^(10,11) Guidelines for the management of DR developed by the National Health and Medical Research Council, Australia recommend a biennial eye examination for patients who have a normal retina at the first eye examination.⁽⁴⁾

The proportion of patients who undergo regular

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Table I. Demographics of known diabetics who had previously undergone eye examinations.

Demographic	Known diabetics	Known diabetics who had eye examination	No. (%); 95% CI			Missing data
			< 1 yr	1–2 yrs	> 2 yrs	
Age (yrs)						
18–29	34	6 (17.6); 4.6–30.7	1 (16.7); 0.0–49.4	3 (50.0); 6.1–93.3	2 (33.3); 0.0–74.7	0
30–39	128	40 (31.3); 23.2–39.3	13 (33.3); 18.3–48.3	22 (56.4); 40.6–72.2	4 (10.3); 0.6–19.9	1
40–49	514	204 (39.7); 35.5–43.9	73 (36.7); 30.0–43.4	102 (51.3); 44.3–58.2	24 (12.0); 7.5–16.6	5
50–59	857	387 (45.2); 41.8–48.5	116 (31.4); 26.7–36.2	187 (50.7); 45.6–55.8	66 (17.9); 14.0–21.8	18
60–69	573	290 (50.6); 46.5–54.7	87 (31.5); 26.0–37.0	139 (50.4); 44.4–56.3	50 (18.1); 13.6–22.7	14
≥ 70	267	134 (50.2); 44.2–56.2	41 (33.9); 25.4–42.4	50 (41.3); 32.5–50.1	30 (24.8); 17.1–32.5	13
Gender						
Male	1,023	477 (46.6); 43.6–49.7	148 (31.9); 27.6–36.1	237 (51.1); 46.5–55.6	79 (17.0); 13.6–20.5	13
Female	1,350	584 (43.3); 40.6–45.9	183 (33.5); 29.5–37.5	266 (48.7); 44.5–52.9	97 (17.8); 14.6–21.0	38
Ethnicity						
Malay	1,376	612 (44.5); 41.8–47.1	185 (31.8); 28.0–35.6	291 (50.0); 45.9–54.1	106 (18.2); 15.1–21.4	30
Chinese	440	186 (42.3); 37.6–46.9	65 (36.5); 29.4–43.6	87 (48.9); 41.5–56.2	26 (14.6); 9.4–19.8	8
Indian	418	193 (46.2); 41.4–51.0	57 (31.0); 24.3–37.7	96 (52.2); 44.9–59.4	31 (16.8); 11.4–22.3	9
Indigenous	109	56 (51.4); 41.9–60.8	20 (38.5); 25.1–51.8	21 (40.4); 26.9–53.9	11 (21.1); 9.9–32.4	4
Others	30	14 (46.7); 28.5–64.8	4 (28.6); 4.0–53.2	8 (57.1); 30.2–84.1	2 (14.3); 0.0–33.3	0
Total	2,373	1061 (44.7); 42.7–46.7	331 (32.8); 29.9–35.7	503 (49.8); 46.7–52.9	176 (17.4); 15.1–19.8	51

CI: confidence interval; DM: diabetes mellitus

eye examinations, as recommended by the CPG, is disappointing. Reports from the National Committee for Quality Assurance's Health Plan Employers in the United States showed that 55% of patients with commercial health plans, 62% of those with Medicare plans⁽¹²⁾ and 51% of those with Medicaid plans underwent annual eye examinations.⁽¹³⁾ Findings from the Melbourne Visual Impairment Project showed that half of the patients with DM had not visited an eye care professional in the last two years.⁽¹⁴⁾ Patients who did not adhere to the guidelines were of a younger age, had type 2 DM with or without insulin use, had a shorter diabetes duration, had their last eye examination performed by a non-ophthalmologist, and lacked formal education or knowledge about DM.⁽¹⁵⁾ The proportion of patients with DM in Malaysia who have undergone an eye examination is not known. We included this question in the 2006 National Health and Morbidity Study (NHMS) questionnaires and present the findings here.

METHODS

The detailed methodology of the survey was published in the 2006 NHMS report.⁽¹⁶⁾ NHMS was a population-based household survey that included 56,710 respondents; the respondents were selected via a two-stage stratified random sampling method that was proportional to the population size across the 14 states in Malaysia. A total of 34,539 respondents aged ≥ 18 years completed the questionnaire on DM. The response rate for the DM section of the survey was 100%. 2,373 (6.9%) of the 34,539 respondents were

known diabetics, and they were asked two questions on eye examination. The first question was "Have you ever had an eye examination?" The respondents were shown photographs of fundus examination instruments, i.e. a slit lamp, fundus camera, direct and indirect ophthalmoscope. The purpose of showing the photographs was to ascertain whether respondents had undergone the examination of the fundus. The second question was "If yes, when was the last eye examination?" The last eye examination referred to a self-reported estimated time interval between the date of the interview and the time of the last eye examination undergone by the patient. The respondents were given three options: within the last one year, within the last one to two years and more than two years ago. The data was analysed using Stata Statistical Software, Release 8.0 (StataCorp, College Station, TX, USA).

RESULTS

44.7% of the respondents were reported to have previously undergone eye examinations. The percentage was lowest among those aged < 30 years, at 17.6%. There were no significant gender and ethnic differences in the percentage of eye examinations (Table I). Among the diabetic patients who had previously undergone eye examinations, 32.8% reported that their last eye examination was within the last one year, 49.8% in the last one to two years and 17.4% more than two years ago. The pattern of distribution for the duration of the last eye examination was similar across all age groups, ethnicities and genders (Table I). The highest proportion

Table II. Known diabetics who underwent eye examination by place of treatment.

Place of treatment	Known diabetics [†]	Known diabetics who had eye examination ^{**}
Government facilities	1,636	823 (50.3); 47.9–52.7
Private facilities	440	175 (39.8); 35.2–44.4
Self-medication*	63	15 (23.8); 13.2–34.4
No treatment*	67	14 (20.9); 11.1–30.7
Others	9	4 (44.4); 10.0–78.9

*Eye examination was conducted when patients were previously treated by medical doctors. **Data is presented as no.(%); 95% CI. †Data is missing for 158 known diabetics. CI: confidence interval

(50.3%) of those who had previously undergone eye examinations were patients who had been treated at government healthcare facilities. This difference was significant when compared to those who were treated at private healthcare facilities, those who were self-medicated or those who did not seek medical treatment at the time of the survey (39.8%, 23.8% and 20.9%, respectively) (Table II).

DISCUSSION

The NHMS finding of 45% of the DM patients surveyed who had ever undergone eye screening is comparable to the figures of 55%–62%^(11,14) and 50% found in developed countries such as the United States and Australia, respectively.⁽¹⁴⁾ The low percentage of diabetics who had undergone eye examinations may be due to a lack of awareness among healthcare providers (HCP) regarding the need for diabetic eye screening, non-adherence to the CPG, patients defaulting on follow-up examinations, overcrowding at public health clinics or HCPs not being proficient in the use of direct ophthalmoscopes to examine the fundus. An effort to increase awareness of diabetic eye screening among HCPs has been made via the dissemination of the updated CPG.^(4,10,11) With increased awareness, HCPs will be better equipped to provide health education on DM and its management and to emphasise the need to undergo regular eye examinations.

Although a comprehensive eye examination is best conducted by an ophthalmologist who is experienced at managing DR,^(4,10) this ideal approach cannot be employed in most countries due to the scanty number and maldistribution of ophthalmologists. Eye care professionals such as optometrists and non-ophthalmic HCPs, such as general practitioners or nurses, can be trained to check visual acuity and examine the fundus. In most primary care settings, the only available tool to examine the fundus is a direct ophthalmoscope.

However, a considerable amount of skill and time is required to examine the patient's fundi using a direct ophthalmoscope, especially in cases of an undilated pupil or in the presence of a cataract. With advancements in technology, diabetic eye screenings are being conducted using digital fundus cameras in Australia,⁽¹⁷⁾ the United States,⁽¹⁸⁾ the United Kingdom⁽¹⁹⁾ and Thailand.⁽²⁰⁾ Some of these countries employ the telemedicine approach, where the fundus images are sent to grading centres via the internet for grading by ophthalmologists.^(17,18) Digital fundus cameras have been shown to be equally sensitive and specific as direct ophthalmoscopy in detecting DR.⁽²⁰⁾ The cost-effectiveness of screening DR using a digital fundus camera has been shown to be superior to the costs of conventional direct ophthalmoscopy.⁽²¹⁻²³⁾

Over the last decade, the MOH has procured 50 non-mydriatic fundus cameras and placed them in primary health clinics.⁽²³⁾ These cameras are operated by paramedical staff who capture the fundus images, while trained family medical specialists or medical officers view and grade the images. There are many benefits to using a fundus camera in diabetic eye screening. For example, patients no longer need to travel to an ophthalmology clinic for a routine diabetic eye examination; this saves both time and money. With fundus images saved on a computer, doctors can grade the images outside busy clinic hours, which helps to reduce the waiting time. When in doubt, the images can be sent via the internet for consultation. The print-out can also be sent together with the referral letter when necessary. With a prompt review of the fundus status, doctors can advise patients who have any form of DR to tighten their blood sugar control, which will delay or prevent the progression of DR.

All stakeholders involved in the management of DM should adhere to the diabetic eye screening guidelines and ensure that patients are aware of the importance of regular scheduled diabetic eye screening. Doctors who treat patients with DM should attempt dilated fundus examinations or refer patients to healthcare facilities where such examinations can be conducted either by ophthalmologists or at health clinics with non-mydriatic fundus cameras. Patients with severe forms of DR should be referred to ophthalmologists for further management. With early detection and treatment, the incidence of blindness due to DR can be considerably reduced.

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