



A cross-sectional study on factors influencing attendance to eye screening[☆]



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Abstract This study aimed to survey the factors influencing attendance to eye screening among Diabetes mellitus (DM) patients. This cross-sectional survey was carried out among 170 DM patients using self-administered questionnaires. Majority of participants, 45.9% ($n = 78$) highlighted that lack of information regarding diabetes and not understanding the significance of eye screening are the barriers to eye screening. Whereas, 10.6% ($n = 18$) reported lack of access to healthcare facilities, 6.5% ($n = 11$) experienced time limitation and 2.9% ($n = 5$) suffered financial issues. However, more than half of the participants (58.2%) have good knowledge related to diabetic eye complications. There was a significant difference between educational level with patients' attendance in yearly eye screening. Lack of information received by the patients on the importance of eye screening and communication issues seems to be prominent and becomes the reason for patients not attending eye screening.

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Introduction

Diabetes Mellitus (DM) is on a rising trend globally. The International Diabetes Federation (IDF) predicts that the prevalence of DM in South East Asia will increase by twofold by the year 2025. The World Health Organization (WHO) has estimated that in the year 2030, Malaysia would have a total of 2.48 million people with DM.¹ In Malaysia, based on the National Health and Morbidity Survey 2011, the prevalence of known and newly diagnosed diabetes has risen from 11.6%

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in 2006 to 15.3% in 2011 from age above 18 and 30 years old, respectively.²

Diabetic retinopathy (DR) is one of the most common diabetes complications, which affected 36.8% of diabetes patients in Malaysia, and the incidence of visual and ocular complications increases with age and duration of disease.^{2,3} In Malaysia, the prevalence of Diabetic Retinopathy (DR) from the 2007 Eye Registry was 36.8%, slightly higher than the prevalence of 35% found in the Singapore Malay Eye Study 2006.⁴ It was also reported that diabetic retinopathy was the second highest complication among diabetes patients in Malaysia.³ Diabetic retinopathy not just causes physical deterioration due to loss of vision; it also causes a devastating effect to the patients' quality of life including loss of productivity and the socioeconomic burden to the family through changes in daily activity living and roles in their social interaction with others.⁵

Thus, eye screening is one of the important measures to delay the occurrence of blindness due to DR. In the Clinical Practice Guideline, it is recommended that an initial fundus examination for an adult should be conducted after diagnosed with type II Diabetes Mellitus (DM), or within three to five years after the initial diagnosis of type I DM and before conception in pregnant women with pre-existing DM.⁶ Despite the devastating impacts of diabetic retinopathy to the patients with diabetes has presented in the literature, the issue of attendance of patients to the clinic for eye screening was still unresolved. Hence, the findings from this study helped to provide information regarding the underlying cause of poor attendance to eye screening and assist in the development strategies to improve health care services about the eye screening among DM patients in Malaysia.

Method

A cross-sectional study was conducted in 5 primary health care centers and one tertiary health care center in Pahang, Malaysia, with a total of 170 participants aged between 18 years to 70 years old. Multistage cluster sampling was used to select the center involved in this study. Starting from a total of the primary health care center in Pahang, and then narrow down to ten primary health centers in Kuantan, the researcher randomly selected five centers and one tertiary center to involve in this study, which located in Kuantan, Pahang.

A systematic sampling method was used to recruit participants in this study. In systematic sampling, the first subject was drawn randomly, then an odd number of patients were selected and asked to participate in this study. After consented, participants answered the questionnaire by themselves or helped by family members. A total of 170 participants were involved in this study. The researcher was involved in the appointment of DM patients. In each center, participants were invited to this study after they registered for their appointment. Participants were identified through simple random sampling. Upon agreement of participants who participated in this study, informed consent was sorted, and a self-administered questionnaire was distributed. To avoid any bias, the researcher encourages participants to answer personally without accompany them.

However, blurred vision participants were assisted by their family members without influencing participant answers.

The self-administered questionnaire consisted of three sections, namely sociodemographic data, awareness of diabetic eye screening, and knowledge about eye complications of diabetes and eye care. This questionnaire was adapted from a previous study, and the permission to used was obtained.⁷ The total score for knowledge was grouped into four categories: excellent: 75–100%, satisfactory: 50–74%, poor: 25–49%, and very poor: 0–24%. Data were analyzed by using Statistical Package for Social Studies (SPSS) version 20.

Results

A total of 170 diabetic patients comprising 51 male (30%) and 119 female (70%) were involved in this study. Regard to ethnicity, most of the participants were Malay 139 (81.8%), followed by Chinese 19 (11.2%), Indian 11 (6.5%), and others 1 (0.6%). For the educational level, 74 participants have secondary education (43.5%), 43 (25.3%) have no formal education, and only twelve (7.1%) have tertiary education. The majority of participants have income per month less than RM 1000 (71.2%), and only 7 (4.1%) have income RM 4000 and above. The majority of patients have type 2 Diabetes Mellitus 168 (98.8%), as shown in [Table 1](#).

The majority of patients were first diagnosed to have DM between one to five years ago (65, 38.2%), and only ten patients (5.9%) have a long duration of disease from 15 years and above. Most of them have a family history of DM among 109 patients (64.1%). While for current treatment, the majority of them are taking oral medication 136 (80.0%), followed by insulin 24 (14.1%), others 7 (4.1%), diet modification 2 (1.2%), and herbs 1 (0.6%).

For 85 (50%) participants, they lived about 5 km from the clinic, 40 (23.5%) participants lived less than 5 km, 37 (21.8%) participants live 10 km from the clinic, while only 1 (0.6%) participant lived more than 20 km. For transportation, 132 participants (77.6%) came to the clinic by car, while 37 participants (21.8%) came by motorcycle, and only 1 (0.6%) participant came by bus to the clinic, which is summarized in [Table 2](#).

Among 170 participants, 65 (38.2%) of participants aware that nurses performed eye screening, followed by ophthalmologist 52 (30.6%) and doctor 20 (11.8%) in [Table 3](#). Their reason for first-time eye screening was influenced by doctor referral for 132 (77.6%). For 29 (17.1%) participants came by themselves and other reasons were 9 (5.3%), which includes encouragement from relatives and friends.

In [Table 3](#), 147 (86.5%) of participants do not know about the part of the eye that was examined to prevent diabetic ocular complication, but 16 (9.45%) participants knew about the lens, while five stated that the retina (2.9%) and 2 participants (1.2%) stated external eye that involve while eye screening was done. While in [Table 4](#), 116 (68.2%) of participants aware that poor control could affect the eye, 37 (21.8%) do not know how diabetes affects the eye, 9 (5.3%) think it is due to a long duration of disease, 5 (2.9%) erroneously believe overthinking of DM can result in eye complication while 3 (1.8%) think that infection could lead to eye complication.

Table 1 Sociodemographic of participants (N=170).

Variable	f	%
Age (Years) (M±SD)	55.5 (SD ± 11.22)	
21–40 years old	20	11.8
40–60 years old	91	53.5
>61 years old	59	34.7
Gender		
Male	51	30.0
Female	119	70.0
Ethnicity		
Malay	139	81.8
Chinese	19	11.2
India	11	6.5
Others	1	0.6
Educational level		
No formal education	43	25.3
Primary	41	24.1
Secondary	74	43.5
Tertiary	12	7.1
Household income		
RM 1000–1999	121	71.2
RM 2000–2999	26	15.3
RM 3000–3999	6	3.5
RM 4000 and above	10	5.9
Type of DM		
DM Type 1	2	1.2
DM Type 2	168	98.8
Duration of disease		
<1 year and below	37	21.8
2–5 years	65	38.2
6–10 years	33	19.4
11–15 years	25	14.7
15 years and above	10	5.9
Family history		
Yes	25	14.7
No	10	5.9
Current treatment		
Oral	136	80.0
Insulin	24	14.1
Diet modification	2	1.2
Herbs	1	0.6
Others	7	4.1

Chi-square test was used to determine whether there is a significant value between 6 months to one year and more than one-year eye screening with an educational level. In Table 5.0, the result shows that no significant difference between these factors with the frequency of eye screening. However, there was a significant difference between no formal education, primary, secondary, and tertiary educational, $\chi^2 = 8.32$, $df = 2$, $p < 0.05$. Therefore, the educational level has a relationship with patients' attendance to yearly eye screening, as summarized in Table 5.

Table 2 Access to the health care center.

Access	F	%
Home distance		
<5 km	40	23.5
5 km	85	50.0
10 km	37	21.8
20 km	7	4.1
>20 km	1	0.6
Transportation		
Motorcycle	37	21.8
Car	132	77.6
Bus	1	0.6

Table 3 Awareness of diabetic ocular complication.

Items	f	%
Have you attended talk on diabetic eye care?		
Yes	98	57.6
No	61	35.9
Not sure	11	6.5
Parts of eye that can be affected by diabetes		
Lens	16	9.4
External eye	2	1.2
Retina	5	2.9
Don't know	147	86.5
Diabetes can affect the eye through		
Poor control	116	68.2
Long duration of disease	9	5.3
Infection	3	1.8
Thinking too much of DM	5	2.9
Don't know	37	21.8

Discussion

Participants' mean age was 55.5 years, with an age range between 21 years and 79 years. In this study, the involvement of elderly patients in Diabetic eye screening (DES) was more than the young generation. It may be due to working hours, seeking private consultation, and time constraints. It was also found in a previous study that younger patients were more likely to not attend follow up, which related to the work commitment.⁸ The young age group has a higher propensity for non-attendance to diabetic eye screening who missed two years of screening. The results suggest that missing screening for as little as two years, among participants who have mild retinopathy, at their first screen may be associated with an increased likelihood of having referable retinopathy or maculopathy detected when they next return to be screened. The researcher thinks this is likely to reflect the highly mobile young population resident in the three boroughs under investigation. Participants might have missed screening either because they did not attend or because they were not invited.

Besides, this factor may occur due to daily activity. Socioeconomic stability becomes an important need in building a new family make their priority shift toward earning a good income. A study found that some patterns of

Table 4 Awareness of diabetic eye screening.

Items	<i>f</i>	%
<i>Have you ever had last eye screening for last 2 years?</i>		
Yes	127	74.7
No	20	11.8
Not sure	23	13.5
<i>How frequently should a person with diabetic undergo an eye check-up?</i>		
Every 6 months	30	17.6
Yearly	64	37.6
2 yearly	5	2.9
Only when vision is affected	6	3.5
Do not know	65	38.2
<i>Which health care professionals help to monitor changes in your eyes?</i>		
Ophthalmologist	52	30.6
Optometrist	12	7.1
Doctor	20	11.8
Nurses	65	38.2
Others	21	12.4
<i>How often you see your eye care practitioner?</i>		
Every 6 months	35	20.6
Yearly	64	37.6
2 Yearly	5	2.9
Only when vision is affected	10	5.9
Do not know	56	32.9
<i>Who encourage you to come for eye screening?</i>		
Myself	81	47.6
Spouse	41	24.1
Relative	38	22.4
Friends	1	0.6
Others	9	5.3

Table 5 The relationship between sociodemographic and frequency of eye screening.

Variable	6 month-1 year	>1year	χ^2 (df)	<i>p</i> -Value
<i>Gender</i>				
Male	27 (72.7)	24 (33.8)	0.84 (1)	0.39*
Female	72 (72.7)	47 (66.2)		
<i>Type of DM</i>				
DM Type 1	2 (2.0)	0 (0%)	1.45 (1)	0.51*
DM Type 2	97 (98%)	71 (100)		
<i>Duration of disease</i>				
<10 years	91 (91.9)	69 (97.2)	2.07 (1)	0.19*
>10 years	8(8.1)	2 (2.8)		
<i>Family history</i>				
Yes	68 (68.7)	41 (57.7)	2.15 (1)	0.15*
No	31 (31.3)	30 (42.3)		
<i>Ethnicity</i>				
Malay	77 (77.8)	62 (87.3)	2.53 (1)	0.16
Non-Malay	22 (22.2)	9 (12.7)		
<i>Educational level</i>				
Primary and no formal education	42 (42.4)	42 (59.2)	8.32 (2)	0.02**
Secondary education	46 (46.5)	28 (39.4)		
Graduate and above	11 (11.1)	1 (1.4)		

* Fisher Exact Test.

** Significant Level, *p*-value <0.05.

commonalities had been observed in the profiles of the Malaysian youths, especially in terms of particular personality traits, socioeconomic background, and nature of business activities and development.⁹ Regard to the ethnicity of participants was majority Malay, meaningful comparison cannot be made. In contrast with this study, the National Health Malaysian Survey 2006 found that the Indians had the highest prevalence of diabetes 19.9%, followed by Malays 11.9% and Chinese 11.4%. from 59,938 adults.¹⁰

Besides, higher socioeconomic status and higher educational levels have associated with the diabetics having an annual eye examination.¹¹ This condition is related to their awareness of the consequence of diabetic ocular complication and prevention measures. An increased duration of disease more than five years have a relation to compliance with diabetic eye screening.¹² Moreover, family members also provide one of the information sources among diabetes patients in their self-management.¹³ The interaction process gives influence in the decision-making process of eye screening and follows up session.

There are a few limitations in this study where did not address comorbidities aspects of DM, such as obesity, dyslipidaemia, chronic kidney disease, chronic vascular disease, depression, and sleep disorder. Four common tests for diabetes-monitoring tests include HbA1C levels (low-density lipoprotein, cholesterol levels were not included in this study. In the future, the confounding factor of diabetes mellitus; hypertension should be included.

Conclusion

Factors influencing decisions for eye screening include diabetes patients' educational status, encouragement of health care providers, and services provided. All facilitators should help to impede the number of attendees while the measure to overcome the barriers should take place. High health literacy among our population provides a catalyst to modify their lifestyles, improve their health-related quality of life aspects, and become more proactive in their life decisions. To iterate, the need for collaborative measures between researches, education, clinical, and non-profit organization areas will gear our health care system for better sustainability and stability in terms of funding, human resource management, and facilities. The provision of mobile community eye screening and optimizing the utilization of current facilities, is the current options that could help to screen early DR patients.

Conflict of interest

The authors declare no conflict of interest.

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