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Received 11 Sept 2017.
Revised 05 Oct 2017.
Accepted 11 Oct 2017.
Published Online 01 Dec 2017

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Community Eye Service Program: Factors Associated with Delayed Presentation to A Tertiary Centre Post Community Screening

Abstract - Early detection and prompt treatment of eye diseases can prevent visual disability. To our knowledge, there is no published data on factors associated with delayed presentation of eye diseases in Malaysia. Our objective is to determine the proportion of patients with eye disease who had a delayed presentation to an ophthalmologist after an initial screening, as well as the factors associated with delay in seeking treatment. This was a retrospective cohort study of patients with eye diseases detected during a Community Eye Survey (CES) program from September 2004 to December 2012 who were referred to the ophthalmologist in Hospital Universiti Sains Malaysia (USM). Delayed presentation of eye disease was defined as patients who came to the eye clinic more than six months after eye screening. Multiple logistic regression was used for analyses. A total of 434 patients who were referred to Hospital USM, Kubang Kerian were included in the study. Their mean (standard deviation) age was 55.65 (21.62) years. The majority of patients (76%) had delayed presentation of eye disease post screening. Type of ocular diseases was not associated with delayed presentation. The factors associated with delayed presentation were unemployment (adjusted odds ratio (OR): 2.51, 95% CI (1.36, 4.64), $p<0.05$) and non-hypertensive status (adjusted OR: 2.31, 95% CI (1.39, 3.84) $p<0.05$). As a conclusion, delayed presentation to an ophthalmologist is common among patients post community eye screening in Kelantan. Unemployment and absence of systemic diseases increased the risk of delayed presentation to a tertiary centre. Increasing public awareness might shorten the time of presentation to the eye clinic.

***Keywords* — community eye service, delayed presentation, eye disease, ophthalmology**

1 INTRODUCTION

Delayed presentation of eye disease to an ophthalmologist is common. Approximately 50% of patients with glaucoma in developed countries are unaware of their disease, and this estimate is likely to be higher in developing countries [1]. Cataract is the leading cause of unilateral (38.9%) and bilateral (65.2%) blindness [2]. Various factors may act as barriers hindering access to eye care services. These include low rates of insurance coverage, cultural barriers, linguistic barriers, poor access to primary care and specialty care, lack of education/awareness, lack of a regular healthcare provider and financial difficulties [3,4]. Fear of losing a job due to frequent clinic visits, fear of laser treatment and guilt are other factors which have been found to deter patients from attending eye clinics [5].

Early presentation and prompt treatment of eye diseases can prevent disability or blindness. Visual impairment may affect activities of daily living, cause falls and injuries, and result in social isolation and depression, loss of productivity, and even premature death [6]. Disabilities related to poor vision as part of advanced or untreated eye conditions will diminish the quality of life and economic productivity as well as increase health care expenditures [3]. Visual impairment is associated with a substantial health burden among Asians in Singapore [7]. The American Academy of Ophthalmology has recommended that older people must be seen by an ophthalmologist at least once per year, and even more frequently as their eye disease warrants [8].

This study was conducted to identify the proportion of patients with eye disease who had a delayed presentation to an ophthalmologist after an initial screening, as well as the factors associated with delay in seeking treatment. To date, most of the research on this topic has been conducted in developed countries and among minorities. No similar study done has been published in Malaysia. This study is important for clinicians to have a better understanding of

patient management and to help policy makers implement strategies and activities to prevent delayed presentation of eye diseases.

2 METHODS

This study was a retrospective cohort study of patients detected through the community eye screening (CES) program conducted by the Department of Ophthalmology, School of Medical Sciences, Universiti Sains Malaysia. The CES program involved detection of eye diseases at a community level and incorporated hands on learning for undergraduate and postgraduate students. The project was initiated in 1994, involving all districts in Kelantan, which is a northern state of Malaysia. However, proper and standardized case report forms (CRF) and a database were only started in 2004. The initial examination was conducted by undergraduate students with basic tools; Snellen chart for visual acuity, pen-torch and direct ophthalmoscopy. If the visual acuity was less than 6/18, and the initial examination results were suspicious, the patients were re-examined by the postgraduate students (ophthalmologists in training). Based on the diagnosis made by the postgraduate students, the patients were then referred to the nearest tertiary hospitals with ophthalmology services in Kelantan; Hospital Universiti Sains Malaysia (HUSM), Hospital Raja Perempuan Zainab II (HRPZII) and Hospital Kuala Krai. A specific appointment date was given to the patients if the referral for HUSM was chosen. The appointment date given was within 2-4 weeks post screening.

The data was extracted from the CES database of screening performed between September 2004 and December 2012. A total of 3895 individuals were screened during the program. From the database, 455 individuals were referred to ophthalmology clinic, HUSM. Data of 455 individuals including ocular findings, systemic diseases, address and occupation were extracted from the database. Medical records were then searched based on their identification card (recorded in the database). Those with more than 30% missing data were excluded

For the purpose of analysis, the subjects' occupations were classified as employed and unemployed. Those who were paid a monthly salary by the government, government agencies or private companies, such as teachers and technicians, were categorized as employed. Those who were not receiving a monthly salary, such as housewives, odd job workers, retirees were considered unemployed. Based on their home address, the distance from HUSM was calculated using the Google Map program.

Delayed presentation to the tertiary hospital was defined as patients presenting to the ophthalmology clinic, HUSM more than six months from the date of screening. Early presentation referred to those patients who presented to the clinic within six months of the date of screening. Final ocular diagnosis referred to the diagnosis made after proper, thorough ocular examination and investigation conducted in ophthalmology clinic, HUSM. The diagnosis category 'others' includes conditions such as pseudophakia, post-squint surgery status and ophthalmoplegia.

Data entry and analysis was done using SPSS Version 22 (IBM Corp, 2013). Numerical data were summarized as mean (standard deviation (SD)) or median (interquartile range (IQR)) depending upon the normality of distribution, whereas categorical data were presented as frequency (percentage (%)). Simple and multiple logistic regression were used to identify the factors associated with delayed presentation of eye diseases. Age, occupation, systemic diseases, history of trauma, distance from home to HUSM and diagnosis was selected for multiple logistic regression analysis. A stepwise backward selection procedure was used when selecting significant variables in the model. The interaction term and multicollinearity problem of the final model was checked. The final model was tested for fitness using the Hosmer-Lemenshow goodness of fit test. A p-value <0.05 was considered to indicate statistical significance.

3 RESULTS

A total 434 patients (out of 455) who were referred to Hospital USM were included in this study. Twenty one patients were excluded due to missing data or failure to attend their appointment at the ophthalmology clinic by the completion of this study. The mean age was 55.7 (21.6) years (Table 1). There were 230 male patients (53%). The majority of patients (85.3%) were Malay (Table 1). A total of 330 patients (76%) fulfilled the criteria for delayed presentation (Table 1). Among these, 294 (89%) were Malay. Most patients had systemic comorbidities; 80.2% were diabetic and 27% patients were hypertensive (Table 2). Eighty patients had no systemic illness.

A total of 29 (6.7%) patients had a history of eye trauma. The most common clinical diagnosis was cataract, followed by refractive error (18.4%), glaucoma (2.5%) and retinopathy (1.4%).

Table I. Socio-demographic characteristics of the participants

	Referral	Early Presentation	Delayed Presentation
	n (%)	n (%)	n (%)
Total	434	104 (24.0)	330 (76.0)
Age (years)	55.65 (21.62)*	58.47 (15.24)*	54.75 (23.22)*
Gender			
Male	230 (53.0)	51 (49.0)	179 (54.2)
Female	204 (47.0)	53 (51.0)	151 (45.8)
Race			
Malay	370 (85.3)	76 (73.0)	294 (89.0)
Chinese	57 (13.1)	26 (25.0)	31 (9.4)
Other	7 (1.6)	2 (1.9)	5 (1.5)
Occupation			
Employed	61 (14.1)	24 (23.1)	37 (11.2)
	373 (85.9)	80 (77.0)	293 (88.8)
Unemployed			
Diabetes mellitus	79 (18.2)	15 (14.4)	64 (19.4)
Hypertension	117 (27.0)	40 (38.5)	77 (23.3)
Distance (km)	26.44 (29.21)*	27.37 (52.25)*	26.18 (16.65)*

*Mean (SD)

Table II. Comparison of eye diseases between patients who presented early and delayed to ophthalmologist

Diagnosis	Referral	Early presentation	Delayed presentation
	n (%)	n (%)	n (%)
Total	434	104 (24.0)	330 (76.0)
Cataract	204 (47.0)	44 (21.6)	160 (78.4)
Refractive error	80 (18.4)	8 (10.0)	72 (90.0)
Pterygium	30 (6.9)	7 (23.3)	23 (76.7)
Eye trauma	29 (6.7)	8 (27.6)	21 (72.4)
Glaucoma	11 (2.5)	6 (54.5)	5 (45.5)
Eye lid disorder	11 (2.5)	1 (9)	10 (91)
Cornea disorder	5 (1.2)	0	5 (100)
Retina disorder	6 (1.4)	0	6 (100)
Maculopathy	2 (0.5)	0	2 (100)
Strabismus	2 (0.5)	0	2 (100)
Others*	54 (12.4)	30 (55.6)	24 (44.4)

*Others: pseudophakia, post squint surgery, ophthalmoplegia

Employment status was significantly associated with timing of presentation of eye disease (p= 0.003) (Table 3). Based on multivariate analysis, unemployed patients were 2.5 times more likely to have delayed presentation to clinic post community screening (95% CI 1.36, 4.64) (Table 4). Likewise, patients without systemic hypertension were 2.31 times more likely to have delayed presentation of eye disease (95% CI 1.39, 3.84) (Table 4).

Table III. Comparison of demographic data and ocular characteristic between patients with early and delayed presentation

Variable	Early presentation n (%)	Delayed presentation n (%)	p value
Total number of patients	104	330	
Mean age (years)	58.47	54.75	0.127
Male	51 (49.0)	179 (54.2)	0.354
Female	53 (51.0)	151 (45.8)	
Occupation			
Employed	24 (23.0)	37 (11.2)	**0.003**
Unemployed	80 (77.0)	293 (88.8)	
Average distance (km)	27.37	26.18	0.753
Diabetes mellitus	15 (14.4)	64 (19.4)	0.254
Hypertension	40 (38.5)	77 (23.3)	**0.003**
Ocular characteristics			
Eye trauma	8 (27.6)	21 (72.4)	0.637
Cataract	44 (21.6)	160 (78.4)	>0.95
Refractive error	8 (10.0)	72 (90.0)	>0.95
Pterygium	7 (23.3)	23 (76.7)	>0.95
Glaucoma	6 (54.5)	5 (45.5)	>0.95
Eye lid disorder	1 (9)	10 (91)	>0.95
Cornea disorder	0 (0)	5 (100)	>0.95
Retina disorder	0 (0)	6 (100)	>0.95
Maculopathy	0 (0)	2 (100)	>0.95
Strabismus	0 (0)	2 (100)	>0.95
Others*	30 (55.6)	24 (44.4)	>0.95

*Others: pseudophakia, post squint surgery, ophthalmoplegia
P< 0.05 is considered statistically significant difference based on simple logistic regression.

Table IV. Associated factors of delayed presentation to tertiary centre using multiple logistic regression (n=434)

Variable	b	Adjusted OR (95% CI)	p value
Occupation Unemployment	0.92	2.51 (1.36, 4.64)	0.003
No Hypertension	0.84	2.31 (1.39, 3.84)	0.001

OR: odd ratio, CI: confidence interval
The goodness of fit of this model was checked using the Hosmer Lemenshow test; 0.900. This result gives no evidence of lack of fit of the model.

4 DISCUSSION

Barriers to seeking treatment are a challenging issue in any healthcare system [8]. The present study attempted to assess factors associated with delayed presentation to an ophthalmologist post diagnosis of eye disease via a community-based screening program. Community-based programs aim to facilitate access to healthcare systems. Based on the recent National Eye Survey II (NES II), the Eastern Zone (Kelantan, Terengganu and Pahang) recorded that among 11387 people with blindness, 60% were due to cataract [10]. Kelantan is a state situated in northeast of Malaysia, near to the Thailand border. Majority (93%) of the population are Malays. It is one of the poorest states in the West Malaysia, with more than 30% of households earning less than RM2, 000 per month (USD 465) [11].

The CES program was initiated to increase public awareness of eye conditions, enable early detection of eye diseases especially cataract, and facilitate accessibility to eye care services, while provide a teaching and learning experience to undergraduate and postgraduate students. Unlike a mobile eye care program, immediate surgery or treatment is not available. Identified subjects are still required to seek treatment at the tertiary centre. The referral is based on patients' preference and accessibility to the tertiary centre. This is also to ensure commitment of the patients towards long term follow up if needed.

The majority of our patients delayed their initial visit to the HUSM ophthalmology clinic. Refractive errors and eye diseases such as cataract, glaucoma, and pterygium were the common causes of ocular disorder in our patients. The gradual onset of blurring of vision and slow progression of disease nature may cause the delay in seeking treatment. Similar to our findings, Oduntan and Raliagheva observed that only 39% of their respondents sought eye care services despite availability and accessibility of the service [12]. Eye care services in Kelantan are provided by the government at a minimal cost (1.30USD per clinic visit), and at higher cost by private ophthalmologists. There are eight eye care centres (four public hospitals, one private hospital and three private eye centres) in the state. In general, the ratio of ophthalmologist to population in Kelantan is 0.03 per 10,000 populations [13].

Utilization of eye care services is affected by public perception, health care system and individual factors [14]. Individual factors include individual needs, enabling factors and predisposing factors [15]. In this study, we evaluated the factors that may influence treatment seeking behavior post a population-based screening program. Enabling factors are factors concerning family and community resources and accessibility to the resources. Predisposing factors include age, gender, race, marital status, occupations, belief, knowledge and values. Delayed presentation to a hospital with eye care services may lead to deterioration to an advanced disease stage and potential blindness

Lack of financial support in old age increased the risk of delayed presentation by 2.5 folds (95% CI 1.36, 4.64) in the present study. Unemployment and older age may lead to high dependency on children and family members, including transport to hospital. Affordability to eye care does not depend only on the cost of eye care, but involves indirect costs as well; transportation to hospital, loss of a day at work for the patients and caregivers accompanying them to the hospital, and living expenses during the admission period [4,16]. However, the definition on unemployment in this study was rather vague. We included pensioners such as retired government servants who still receives monthly pension under the unemployed category. This may cause overestimation of the factors affecting delayed presentation and inaccuracy in estimation of the financial burden to the affected individuals.

In addition, our study is limited by its absence of data on household income. Household income is important to give a better understanding of the financial status of the family. Although there is no information on the living status of our patients, we believe that many of them are staying with their relatives. Liza-Sharmini *et al*. reported that the majority of glaucoma patients in Kelantan lived with extended family [17]. Living with family members provides good social support that may give a false sense of security. Patients with poor vision may feel comfortable being housebound with good family support, thus feel less of a drive to seek medical attention.

Unemployment has been found to affect the compliance of hypertensive patients to follow up [18]. Patients with systemic hypertension tend to be elderly and asymptomatic, similar to patients with most eye diseases. Due to this similarity, it is acceptable to extrapolate the

compliance or receptiveness to health care in patients with hypertension to those with eye diseases. However, in the study described by Smith *et al,* social support and health system accessibility were far better than current study [18].

In general, the elderly seek eye care services more than younger individuals [19]. Unfortunately, elderly may prioritize themselves less, especially in families with financial difficulties. In addition, they may have the attitude that 'poor vision is part of aging', which may delay their health seeking behavior [20]. There was no significant difference between gender and delayed presentation in the present study. Although there was no significant difference in gender distribution; more men were detected during community screening and had delayed presentation to the eye clinic. Men have been found to be less sensitive to health related symptoms and less likely to seek treatment [21].

'Sick eye in the sick body' is an attempt to describe the impact of eye disease in patients with preexisting systemic diseases. It is believed that there is no direct risk of eye diseases in patients with systemic co-morbidities, but that the increased prevalence is mainly due to increased detection in patients who visit health centres regularly [22]. The presence of systemic diseases especially systemic hypertension may be a blessing in disguise [23]. Absence of systemic hypertension was found to increase the risk of delayed presentation by 2.3 times (95% CI 1.39, 3.84) among our referral patients. Other factors that may affect delayed presentation to the eye clinic include poor awareness of availability of services that may lead to underutilization of affordable services, lack of knowledge on eye diseases, socio-cultural and beliefs, and patients' need and perceptions [24,25]. These factors were not assessed in this present study.

5 CONCLUSION

There was a large proportion of patients with delayed presentation to eye care providers post community eye screening in Kelantan, a state in Malaysia. Unemployment and absence of systemic diseases especially hypertension increased the risk of delayed presentation. Delayed presentation to a tertiary centre with eye care services may lead to blindness, thus placing an economic burden on the family and health system. Further studies looking into the factors associated with delayed presentation to eye care providers may improve the prevention of blindness efforts in developing countries such as Malaysia.

CONFLICTS OF INTEREST

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

REFERENCES

[1] Mohammadi S-F, Saeedi-Anari G, Alinia C, Ashrafi E, Daneshvar R, Sommer A. Is Screening for Glaucoma Necessary? A Policy Guide and Analysis. *Journal of Ophthalmic & Vision Research*. 2014; 9(1):pp.3-6.

[2] Wong TY, Chong EW, Wong WL, Rosman M, Aung T, et al. Prevalence and causes of low vision and blindness in an urban malay population: the Singapore Malay Eye Study. *Arch ophthalmol* (Chicago, Ill: 1960). 2008; 126(8):pp.1091-1099.

[3] Morales LS, Varma R, Paz SH, Lai MY, Mazhar K, et al. Self-Reported Use of Eye Care among Latinos: The Los Angeles Latino Eye Study. *Ophthalmology*. 2010; 117(2):pp.207-215.

[4] Melese M, Alemayehu W, Friedlander E, Courtright P. Indirect costs associated with accessing eye care services as a barrier to service use in Ethiopia. *Trop Med Int Health*. 2004; 9(3):pp.426-431.

[5] Lewis K, Patel D, Yorston D, Charteris D. A Qualitative Study in the United Kingdom of Factors Influencing Attendance by Patients with Diabetes at Ophthalmic Outpatient Clinics. *Ophthalmic Epidemiol*. 2007; 14(6):pp.375-380.

[6] Vu H, Keeffe J, McCarty C, Taylor HR. Impact of unilateral and bilateral vision loss on quality of life. *BJO*. 2005; 89(3):pp.360-363.

[7] Wang X, Lamoureux E, Zheng Y, Ang M, Wong TY, et al. Health burden associated with visual impairment in Singapore: the Singapore epidemiology of eye disease study. *Ophthalmology*. 2014; 121(9):pp.1837-1842.

[8] Orr P, Barrón Y, Schein OD, Rubin GS, West SK. Eye care utilization by older Americans: The SEE project. *Ophthalmology*. 1999; 106(5):pp.904-909.

[9] Balarajan Y, Selvaraj S, Subramanian SV. Health care and equity in India. *The Lancet*. 2011; 377(9764):pp.505-515.

[10] National Eye Surey II (NES II). Prevention of Avoidable Blindness 2014-2019. WHO Global action plan. MOH. Malaysia.

[11] Hassan, Che Hashim Bin, Poverty in a Malay State in Malaysia: A Socio-Demographic Study (2011). Society of Interdisciplinary Business Research (SIBR) 2011 Conference on Interdisciplinary Business Research. Available at SSRN: https://ssrn.com/abstract=1867885 or http://dx.doi.org/10.2139/ssrn.1867885.

[12] Oduntan AO, Raliavhegwa M. An evaluation of the impact of the eye care services to the rural communities in the Mankweng Health Sub-district of the Northern Province. SAfr Optom. 2001; 60:pp.71-76.

[13] Goh PP, Elias H, Norfariza N, Mariam I. National Eye Database--a web based surveillance system. *Med J Malaysia*. 2008; 63:pp.20-23.

[14] Andersen RM. Revisiting the behavioral model and access to medical care: does it matter? *J. health soc. behav*. 1995:1-10.

[15] Owsley C, McGwin G, Scilley K, Girkin CA, Phillips JM, et al. Perceived barriers to care and attitudes about vision and eye care: focus groups with older African Americans and eye care providers. *Invest ophthalmol vis sci*. 2006; 47(7):pp.2797-2802.
[16] Lewallen S, Courtright P. Recognising and Reducing Barriers to Cataract Surgery. *CEHJ*. 2000; 13(34):pp.20-21.
[17] Liza-Sharmini AT, Ng GF, Nor-Sharina Y, Khairil Anuar MI, Nik Azlan Z, et al. Clinical presentation, severity and progression of primary angle closure in malay and chinese patients. *Med J Malaysia*. 2014; 69(6):245-251.
[18] Smith Eb, Curb JD, Hardy RJ, Hawkins CM, Tyroler HA. Clinic Attendance in the Hypertension Detection and Follow–up Program. *Hypertension*. 1982; 4(5):710-715.
[19] Prevent Blindness America. Vision problems action plan: a national public health strategy 2004. Schaumburg (IL): Prevent Blindness America; 2004.
[20] Gupta I, Dasgupta P, Sawhney M. Health of the Elderly in India. Some aspects of vulnerability. Discussion paper series No.26. Delhi, India: Institute of Economic Growth, 2001.
[21] Macintyre S, Hunt K, Sweeting H. Gender differences in health: are things really as simple as they seem? *Soc. Sci. Med*. 1996; 42(4):pp.617-624.
[22] Ling N, Ling T, Bukhari SM, Yaakub A, Tajudin LS. The sick body is not associated with the sicker eye. *J Clin Ophthalmol and Res*. 2015; 3(3):pp.143-147.
[23] Olusanya BA, Ashaye AO, Owoaje ET, Baiyeroju AM, Ajayi BG. Determinants of utilization of eye care services in a rural adult population of a developing country. *MEAJO*. 2016; 23(1):pp.96-103.
[24] Brian G, Maher L, Ramke J, Palagyi A. Eye care in Fiji: a population-based study of use and barriers. *Ophthalmic epidemiol*. 2012; 19(2):pp.43-51.
[25] Robbins I, Gordon A, Dyas J, Logan P, Gladman J. Explaining the barriers to and tensions in delivering effective healthcare in UK care homes: a qualitative study. *BMJ Open*. 2013; 3(7) e003178.