

Prevalence and Causes of Visual Impairment and Blindness in a Rural Population in Sepang District, Selangor

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Summary

A community based cross-sectional study was carried out to determine the prevalence and causes of visual impairment and blindness in residents aged forty years and above in kampung Jenderam Hilir of Sepang district, Selangor state. A total of 311 out of 341 (91.3%) respondents participated in this study. The prevalence of visual impairment and blindness observed was 18.9% and 2.9% respectively. The prevalence of visual impairment and blindness increased significantly with age. Amongst the 159 respondents who agreed for eye checkup, refractive errors (56%), cataract (20.1%), glaucoma (4.4%) and diabetic retinopathy (1.3%) were found to be causing visual impairment and blindness.

Key Words: Visual impairment, Blindness, Refractive errors, Cataract, Glaucoma, Diabetic retinopathy

Introduction

Visual impairment and blindness is a world wide problem. Based on the 1990 global population, there are nearly 38 million blind people and almost 110 million with low vision, giving a total of 148 million people with visual impairment. If the 1996 population situation is applied, there would be a projected number of 45 million blind and 135 million people with low vision. It is estimated that at least 16 million people are blind from cataract and 5.2 million people are blind from glaucoma. The prevalence of blindness increases from 0.08% in children to 4.4% in people aged over 60 years, with an overall global blindness rate of 0.7%¹. Visual impairment can be categorized into four groups (based on the best corrected visual acuity in the better eye)² — no visual impairment (visual acuity between 6/6 and 6/18), visual impairment (visual acuity greater than 6/60 but less than 6/18), severe visual impairment

(visual acuity greater than 3/60 but less than 6/60) and blind (visual acuity less than 3/60 or no perception to light).

In the National Eye Survey Malaysia conducted in 1996, the prevalence of visual impairment in Malaysia was found to be 2.71% which was higher in rural areas (2.87%) than in urban areas (2.54%)³. Only one community based study is available in the literature on this subject from Malaysia by Zainal *et al*⁴ who reported 5.6% of visual impairment and 0.7% of blindness among the residents of Kuala Selangor in Selangor state. Therefore, this study was carried out in kampung Jenderam Hilir, Sepang district of Selangor state to determine the prevalence and causes of visual impairment and blindness in residents aged 40 years and above, and to determine the facilities for eye treatment available in that area.

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Materials and Methods

A cross sectional study was carried out in Kampong Jenderam Hilir, Sepang district which has three mukims (sub-district) namely Dengkil, Sepang and Libu. Jinderam Hilir is one of the kampungs in Dengkil mukim³, and all the residents were Malays. The details of the research project were discussed with the village head, and a letter explaining the objectives was given in each house for the cooperation of the residents. This community study was conducted over a period of three months (June-August 2000) among the residents aged 40 years and above.

A house-to-house survey was carried out to identify the eligible residents, and the respondents were interviewed personally by the medical student (ON). The interviews were conducted in the morning hours. Respondents who were not available in the house were interviewed on the weekends at their convenience. The demographic data, medical and ophthalmic history were collected using a structured pre-tested questionnaire. Visual acuity was tested by the medical student using Snellen's charts at 6 meter distance in a properly lighted place. Pinhole test was performed to determine further improvement of vision. If the subject could read one or more lines on the chart with pinhole, it suggests that the vision can be improved by refraction and prescription of glasses. Vision was tested with glasses whenever a subject was wearing them. The respondents were informed about the examination of their eyes by the ophthalmologist (SCR) in the next visit and an appointment was given for eye check up.

Ocular examination was conducted with a torch light and headband binocular magnifier (1.75X) to identify the presence or absence of any eye disease. The intraocular pressure was measured using a Tono-Pen (microcomputer connected to a Mackay-Marg appplanation tonometer of small diameter) under topical anaesthesia (0.5% proparacaine eye drops). Fundus examination was done using direct ophthalmoscope, after dilating pupils with 1% tropicamide eye drops. Early lenticular opacities, which could not be seen with torch light, were diagnosed with an ophthalmoscope. Immature cataract was diagnosed with a torch light and then confirmed with ophthalmoscopy during fundus examination. The subjects who needed further medical or surgical treatment were referred to the eye clinics in Hospital Kajang or Kuala Lumpur or Klang.

All the findings were recorded on a proforma and the diagnosis of the cause of visual impairment/ blindness

was identified. The data was analyzed using the Statistical Package for Social Sciences (SPSS) computer program. Chi-square test, Student's t and Fisher's exact test were used to determine the association between the prevalence of visual impairment and blindness, and the study factors.

Results

Out of 341 eligible respondents aged 40 years and above, only 311 were successfully interviewed and visual acuity was tested, giving a response rate of 91.2%. Out of these 311 interviewed respondents, 139 (44.7%) were males and 172 (55.3%) were females (Table I). The mean age of respondents was 52.9 years with a range between 40 and 91 years. Overall, impaired vision was noted in 59 (18.9%) respondents. There was no significant difference in the prevalence of impaired vision in females (n=39, 23.5%) as compared to males (n=20, 14.7%), $p > 0.05$. The overall prevalence of blindness was 2.9% (9/311 respondents). There was no significant difference in the prevalence of blindness in females (n=5, 3.5%) as compared to males (n=4, 2.2%), $p > 0.05$.

Visual impairment increased from 8.9% in the age group of 40-49 years to 57.1% in the age group above 80 years. Severe visual impairment increased from 1.4% in the age group 40-49 to 28.6% in those aged above 80 years. The increasing visual impairment with age was statistically significant (X^2 test for linear trend $p < 0.001$). Blindness was present in one (0.4%) respondent aged below 60 years and increased to 8 (9.3%) in those aged 60 years and older. Prevalence of blindness also increased significantly with age (X^2 test for linear trend $p < 0.05$). The mean age of respondents without visual impairment was 51.39 years and with visual impairment was 59.56 years (Student's t test $p < 0.01$).

The common causes of visual impairment and blindness are refractive errors, cataract, glaucoma, diabetic retinopathy and age related macular degeneration. In this study, 159 respondents turned up for eye examination. The most common cause of visual impairment was refractive errors (56%) followed by cataract (20.1%). Glaucoma was seen in 4.4% of the subjects while diabetic retinopathy was seen in 1.3% of the respondents (Table II). There was no case of age related macular degeneration in this study. Some of the subjects had one or more eye diseases in one or both eyes.

Refractive errors : Out of 159 respondents examined, 43 (27%) subjects had 6/6 vision. Twenty-seven (17%) respondents had visual impairment, which could not be improved with pinhole since they had other eye diseases. In the remaining 89 (56%) respondents, 44 persons were already using spectacles at the time of examination. In these people, the refractive error was diagnosed by checking the spectacles. Among these 44 persons, 28 were using glasses for hypermetropia (63.6%), 10 for myopia (22.7%) and 6 for astigmatism (13.6%) either myopic or hypermetropic. The remaining 45 persons were advised to get spectacles since their vision improved with pinhole test. Presbyopia was present in all the respondents since all of them were above the age of 40 years. None of the subjects with refractive errors were blind.

Cataract : Among 32 cataract cases in this study, 14 were early cataract and 18 were immature cataract. One of the patients had undergone cataract operation (posterior chamber intraocular lens implantation) in one eye. There was no case of mature cataract in this study. Amongst those with cataract, 18 (56.2%) had no visual impairment, seven (21.9%) had visual impairment, one (3.1%) had severe visual impairment, and six (18.8%) were blind as per WHO criteria of visual impairment.

Glaucoma : Among 7 cases of glaucoma, six were primary open-angle glaucoma (diagnosed by history, raised intraocular pressure and glaucomatous cupping of the optic disc) and one was primary narrow-angle glaucoma (diagnosed by history, shallow anterior chamber, evidence of trabeculectomy operation and glaucomatous cupping of the optic disc). Two patients (one open angle glaucoma and one narrow angle

glaucoma) were already taking treatment. The other 5 cases were detected in this survey, and were referred to Hospital Kajang for treatment. Among the people with glaucoma, five (71.4%) had no visual impairment, one (14.3%) had visual impairment and one (14.3%) was blind as per WHO criteria of visual impairment.

Thirteen persons (8.2%) in this study were known cases of diabetes mellitus, and were taking treatment regularly -- nine diabetes alone and four with diabetes and hypertension. Diabetic retinopathy was found in two of 159 respondents (1.3%) -- one had background diabetic retinopathy with maculopathy resulting in visual impairment and the other had proliferative diabetic retinopathy resulting in blindness. Both the patients did not have hypertension and were elderly subjects between 60 and 69 years age. Two among these 13 diabetics had unilateral VII nerve palsy resulting in lagophthalmos, but there was no exposure keratitis.

Hypertensive retinopathy : Twenty four persons (15.1%) in this study were known cases of hypertension, and were taking treatment regularly. Hypertensive retinopathy (grade II) was seen in 10 subjects, and none of them had any visual impairment. Four among these 24 were also taking treatment for diabetes mellitus and one for ischemic heart disease, while two persons had previous attack of hemiplegia.

Treatment for eye problems : More than two-thirds of the patients (77.8%) received treatment from non-ophthalmologists (private general practitioners, general physicians in health centers and opticians - Table III). This indicates clearly that there is a need of eye care facilities by an ophthalmologist in Sepang district.

Table I: Age and sex distribution of respondents (n=311)

Age	Males	Females	Total
40 - 49 years	71	75	146
50 - 59 years	33	46	79
60 - 69 years	26	34	60
70 - 79 years	7	12	19
80 years and above	2	5	7
Total	139	172	311

Table II: Prevalence of various eye diseases seen in 159 respondents

Eye diseases	Number	Percentage
Refractive error	89	56.0 %
Cataract	32	20.1 %
Glaucoma	7	4.4 %
Diabetic retinopathy	2	1.3 %
Papilloma of eyelids	9	5.7 %
Xanthelasma of eyelids	2	1.3 %
Naevus of eyelids	2	1.3 %
Lagophthalmos	2	1.3 %
Pinguicula	36	22.6 %
Pterygium	17	10.7 %
Naevus of conjunctiva	1	0.6 %
Dry eye	1	0.6 %
Corneal opacity	1	0.6 %
Hypertensive retinopathy	10	6.3 %
Drusen in the peripheral retina	3	1.9 %
Arcus senilis	71	44.7 %

Table III: Facilities used by the respondents for the treatment of their eye problems (n=311)

Facility	Number	Percentage
State Hospital (HKL, H Klang)	15	4.8%
District hospital(Kajang)	30	9.6%
Health centers	66	21.2%
Private practitioners	109	35.0%
Opticians	67	21.5%
Treatment not taken at all	24	7.7%

Table IV: Prevalence rates of visual impairment and blindness in different countries

Author	Country	Visual impairment	Blindness
Zainal ⁴	Malaysia	5.6%	0.7%
Whitfield et al ⁶	Kenya	2.5%	0.7%
al Faram et al ⁷	Saudi Arabia	0.9%	0.7%
Baasanhu et al ⁸	Mongolia	8.1%	1.5%
Singh et al ⁹	India	29.4%	14.9%
Hirvela & Laatikainen ¹⁰	Finland	10.1%	1.9%
Negrel et al ¹¹	Turkey	1.9%	0.4%
Vassileva et al ¹²	Bulgaria	0.83%	0.49%
Zerihun & Mabey ¹³	Ethiopia	1.7%	0.85%
Nwosu ¹⁴	Nigeria	1.7%	2.0%
Ho et al ¹⁸	Singapore	15.2%	3.0%
PRESENT STUDY	Malaysia	18.9%	0.7%

Table V: Prevalence rates of eye diseases causing visual impairment

Author	Country	Cataract	Glaucoma	Diabetic retinopathy	Refractive errors
Zainal et al ⁴	Malaysia	4.6%	-	-	1.0%
Ho et al ¹⁸	Singapore	78.6%	5.7%	5.1%	-
Whitfield et al ⁶	Kenya	39.0%	2.1%	-	-
al Faram et al ⁷	Saudi Arabia	20.6%	-	-	67.9%
Singh et al ⁹	India	48.5%	6.8%	-	24.5%
Hirvela&Laatikainen ¹⁰	Finland	3.4%	1.5%	0.6%	-
Nagrel et al ¹¹	Turkey	26%	-	-	52.0%
Zerihun&Mabey ¹³	Ethiopia	56.2%	-	-	28.8%
Jonasson&Thordarson ¹⁹	Iceland	19.9%	5.1%	-	-
PRESENT STUDY	Malaysia	5.0%	0.6%	0.6%	56.0%

Discussion

A wide variation in the prevalence of visual impairment and blindness has been reported from different countries in the world (Table IV). The difference between the figures in our study and those reported in the literature could probably be due to (i) the variation in age of the population studied, (ii) type of population (urban/rural/mixed) examined, (iii) difference in the sampling methods used, and (iv) difference in the methodology of eye examination. The prevalence of eye diseases causing visual impairment in Malaysia, Singapore and other countries, in comparison to the present study, is shown in Table V. The variations in these figures could also be due to same reasons as mentioned above.

Limited access to specialist services, environmental climatic stress, poor hygiene and other factors associated with a low standard of living could be the reasons for the high prevalence of blindness in developing countries ^{6,15}. The prevalence of high rates of blindness in a community implies a significant loss of productivity by the citizens of the country. Hence, this aspect has to be given priority by health planners and administrators. In general, this can be achieved by (i) initiating a comprehensive health education programme in the community to increase the awareness of eye diseases and their treatment among

the public, (ii) conducting regular refresher courses on common eye diseases for health centre medical officers so that they can screen the patients for eye diseases, (iii) prescription of spectacles by qualified optometrists to correct refractive errors, (iv) surgical treatment of cataract with intraocular lens implantation, (v) medical and surgical treatment for glaucoma patients, (vi) early diagnosis and treatment of diabetic retinopathy.

In our study, 77.8% of the respondents took treatment for their eye problems from non-ophthalmologists (general practitioners, health centre doctors, and opticians), most likely because the services of eye specialist were not easily available for them. Therefore, there is a need of eye care services by an ophthalmologist in the district hospitals of the country. Most of the measures suggested above can be achieved to a greater extent once the specialist services are made available to the public.

Conclusions

The prevalence of visual impairment was high and there is a need to make eye care facilities available in the districts. Similar studies in different age and ethnic groups of population living in rural and urban areas in different states will give overall prevalence rates of visual impairment and blindness in the country.

1. World Health Organization. Global initiative for the elimination of avoidable blindness. WHO/PBL/97.61, Geneva, 1997, 1.
2. World Health Organization. International statistical classification of diseases and related health problems. Tenth revision, Geneva, 1992, 456-7.
3. National Eye Survey (1996) Visual impairment in Malaysia. Malaysia's Health report, technical report of the Director General of Health Malaysia, Ministry of Health Malaysia, 1999; 243-9.
4. Zainal M, Masrah L, Ropilah AR. Blindness and visual impairment among rural Malays in Kuala Selangor, Selangor. *Med J Malaysia* 1998; 53: 46-50.
5. Sepang District Health 1997. Internet website source. www.dph.gov.my/state/Selangor/Sepang/PKD.htm.
6. Whitfield R, Schwab I, Ross-Degnan D, Steinkuller P, Swartwood J. Blindness and eye diseases in Kenya: ocular status survey results from the Kenya Rural Blindness Prevention Project. *Br J Ophthalmol* 1990; 74: 333-40.
7. al-Faran MF, al-Rajhi AA, al-Omar OM, al-Ghamdi SA, Jabak M. Prevalence and causes of visual impairment and blindness in the south western region of Saudi Arabia. *Int Ophthalmol* 1993; 17: 161-5.
8. Baasanhu J, Johnson GJ, Birendei G, Minassian DC. Prevalence and causes of blindness and visual impairment in Mongolia: a survey of population aged 40 years and elder. *Bull World Health Organ* 1994; 72: 771-6.
9. Singh MC, Murthy GV, Venkatraman R, Nayar S. Epidemiological aspects of visual impairment above 50 years in rural area. *J Indian Med Assoc* 1994; 92: 361-3,365.
10. Hirvela H, Laatikainen L. Visual acuity in a population aged 70 years or older: prevalence and causes of visual impairment. *Acta Ophthalmol Scand* 1995; 73: 99-104.
11. Negrel AD, Minassian DC, Sayek F. Blindness and low vision in southeast Turkey. *Ophthalmic Epidemiol* 1996; 3: 127-34.
12. Vassileva P, Gieser SC, Vitale S, Cholakova T, Katz J, West S. Blindness and visual impairment in western Bulgaria. *Ophthalmic Epidemiol* 1996; 3: 143-9.
13. Zerihun N, Mabey D. Blindness and low vision in Jimmu zone, Ethiopia: results of a population-based study. *Ophthalmic Epidemiol* 1997; 4: 19-26.
14. Nowsu SN. Ocular problems of young adults in rural Nigeria. *Int Ophthalmol* 1998; 22: 259-63.
15. Thylefors B. Prevention of blindness: the current focus. *WHO Cron* 1985; 39: 149-54.
16. Pizzarello LD. The dimension of the problem of eye diseases among the elderly. *Ophthalmology* 1987; 94: 1191-5.
17. Ghafour IM, Allan D, Foulds WS. Common causes of blindness and visual handicap in the west of Scotland. *Br J Ophthalmol* 1983; 67: 209-13.
18. Ho T, Law NM, Goh LG, Yoong T. Eye diseases in the elderly in Singapore. *Singapore Med J* 1991; 32: 268-70.
19. Jonasson F, Thordarson K. Prevalence of ocular diseases and blindness in a rural area in the East region of Iceland during 1980 through 1984. *Acta Ophthalmol* 1987; 65: 40-3.