ORIGINAL ARTICLE

Profile of Low Vision Children in the Special Education Schools in Malaysia

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SUMMARY

This study looked at the causes of vision loss, levels of distance, near vision and the use of low vision devices (LVDs) in children studying at special schools in Malaysia. A total of 139 children from two special education schools took part. Visual acuity was measured with and without LVDs. Those who required further assessment were referred to Low Vision Clinic. Near visual acuity in 71 children ranged from N4 to N64. Sixty eight children could not read the N64 chart or they were totally blind. Only eight students were using LVDs before intervention. Seventy one children were referred for low vision assessment and 48 were found to benefit from the LVDs prescribed. The major cause of visual impairment was cataract (17%). Hand held magnifier was the most preferred LVD. Majority of the children attending the blind schools had residual vision but did not have LVDs. LVDs are able to significantly improve near visual acuity and hence there is a need to prescribe and train the children to use the LVDs.

KEY WORDS:
Low vision devices, Visually impaired students, Low vision assessment

INTRODUCTION

Vision impairment in children has profound psychological, educational and economic effects, not only for individual and their family but also for the community and country[1]. Uncorrected visual impairment in children will result in a great loss of productivity for the country because the impairment years will be longer compared to normal adults. Moreover, additional cost will be needed to provide rehabilitation care to assist these children to be independent citizens in the future[1]. Visual impairment may be caused by a loss of or reduced visual acuity or contrast sensitivity, visual field loss, photophobia, diplopia, visual distortion, visual perceptual difficulties, or any combination of the above[2,3]. These functional limitations can result from congenital, hereditary or acquired conditions[3]. Uncorrected visual impairment in children can cause disability by significantly interfering with their ability to function independently, learn or to move safely in the environment[4]. Furthermore it will also make it hard or impossible to do daily tasks such as reading standard-sized print or writing without specialized adaptations[4,5]. These disabilities can, in turn, limit both personal and socioeconomic independence and ability to perform activities of daily living[1,5,6]. The visual impairment classification according to the World Health Organization (WHO) 1997 defined low vision as "visual acuity of less than 6/18 but equal to or better than 3/60" [2] in the better eye. Blindness is defined as "visual acuity of less than 3/60 (0.05) or corresponding residual visual field of 10 degrees or less in the better eye with best possible correction[2].

Previous studies in developed countries have shown that approximately 85% of the registered blind have some form of vision[3,7]. The vast majority of persons registered as blind come within the category of low vision and do have some form of useful vision that can help them move around in their environment and do things in their daily lives. These studies also suggest that the majority of low vision patients attending various low vision clinics are mainly adults and the elderly[3,7,8,9]. Although visually impaired children constitute a small portion of the visually impaired population, it is important to determine whether or not low vision services available are utilised by these children[9,10]. This is important, as previous studies have shown that children have a very high rate of successful low vision devices use compared to adults[11,12,13]. Several studies have been conducted to investigate visual characteristics of visually impaired children and the usage of low vision devices[7,14]. It was found that many of the visually impaired children were not supplied with the appropriate low vision devices (LVD). Furthermore it was found that visual impairment in these children could be improved with proper use of LVDs.

Presently, there are three special education schools for the blind in Malaysia. There are two primary schools located in Kuala Lumpur and in Johor Bharu respectively, and a secondary school located in Kuala Lumpur. All the blind schools are either residential or national schools. These special education schools for the blind accept both blind and low vision children. A previous study by Reddy and Tan (2001) looked at the causes of childhood blindness in Malaysia and found that the major causes of visual impairment in school children attending the special education schools was disorder of lenses with the majority of these school children having aphakia with associated amblyopia. However, it is believed that, no studies have been conducted to quantify the use of low vision devices in the Special Education Schools in Malaysia. This study was therefore undertaken: (i) to determine the visual characteristics of children studying at the blind schools in Malaysia. (ii) to determine the major causes of visual impairment of the children. iii) to determine the most

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common low vision aids used and prescribed to these children and (iv). to assess the improvement of reading ability associated with the use of LVDs.

MATERIALS AND METHODS

This study was a cross sectional study and one hundred and thirty nine students between the ages of 5-19 years from the primary and secondary special education schools Sekolah Rendah Pendidikan Khas (Buta) Jalan Batu, Kuala Lumpur and Sekolah Menengah Pendidikan Khas (Buta) Setapak, Kuala Lumpur were enrolled into the study.

An interview was conducted at the school with the children and a brief history was taken to chart the age at which they lost their vision and their usage of any LVD/s. The past medical history was taken from the available medical records in schools. A vision screening test for distance and near was conducted on all the children at the schools. For the distant visual acuity measurement, a Bailey-Lovie logMAR chart was used. For kindergarten children who were not able to read or recognise the letters on the Bailey-Lovie logMAR chart, they were shown a card with all the letters in the Bailey-Lovie logMAR chart and were asked to point at the correct letter. The Bailey-Lovie logMAR chart has a number of advantages over the conventional Snellen chart and is particularly well suited to the evaluation of impaired vision[15, 16]. In particular, it is possible to equate acuities obtained at different distances. For near visual acuity a simple Malay language near chart test was used. The reading ability was then determined using the reading test types (related words for primary to secondary school children, and letters for kindergarten children) as approved by the Department of Optometry, Faculty of Allied Health Sciences UKM. This standardised text uses the Time New Roman typeface and is a widely accepted test of reading acuity locally[9,16].

The ocular diagnosis was extracted from the medical records and was confirmed by the ophthalmologists at UKM hospital. Those requiring further low vision assessment were referred to the Low Vision Clinic at UKM. The criteria for further low vision assessment were; i) distant visual acuity better than 6/300; ii) low vision children who do not have low vision aids; and iii) low vision students who had lost their own low vision aid. The exclusion criteria for further low vision assessment were; i) distant visual acuity worse than 6/300 to no perception of light; and ii) low vision students who had low vision aids and were happy with the devices. Low vision assessment at the low vision clinic involved a minimum of two visits. The initial visit would involve refraction (retinoscopic assessment and subjective refraction) to determine the uncorrected refractive error and the type of devices required by the low vision student. At the end of the assessment, the low vision student would be provided with the most suitable devices for them to try for two weeks. Two weeks later the low vision student would be reviewed at the low vision clinic to determine if they found the devices to be useful for them. At the end of the review clinic the devices were prescribed if the low vision student reported that the devices were useful. Should the first device recommended not be suitable, the low vision student would be provided with another type of device to try for another two weeks and the process would be repeated until suitable devices were identified. The data was analysed using SPSS version 12.0.1. This research project was approved by the Universiti Kebangsaan Malaysia (UKM) Human Subject Ethics Committee and followed the tenets of the Declaration of Helsinki.

RESULTS

A total of 139 children participated in this study and this represented the entire enrolment of the two schools with these students being variously in kindergarten to Form 6. Analyses were tabulated in Table I showing the characteristics of the school children attending the two special education schools. The normal age for children attending kindergarten was between 5 to 6 years old, for primary school it was between 7 to 12 years old while secondary school was between 13 to 19 years old. The mean age for the low vision children who attended the kindergarten; primary and secondary schools was 5.5±0.7 years old (range 5 – 6 years), 10.4±2.1 years old (range 7 – 14 years) and 16.1±1.5 years old (range 13 – 20 years) respectively. There were 73 female (52.5%) and 66 male (47.5%) students in this study. The main cause of visual impairment in this study (Figure I) was cataract related cases (17%), followed by childhood nystagmus (15%), amblyopia (14%), retinal dystrophy (12%), glaucoma (7%) and corneal opacity (6%).

Distance visual acuity

For ease of interpretation, data about visual performance recorded using the Bailey- Lovie logMAR chart was converted to the equivalent Snellen Fraction and presented in Table I. The school children who participated in the study had a range of vision from 6/9 to No Perception of Light (NPL). Of the 139 students, 44 students were in the low vision category with distance acuity range of 6/18 to 6/120, while 93 students were in the blind category with visual acuity from worse than 6/120 to NPL. Two students have acuity better than 6/18 but had NPL in the other eye. These students chose to enrol in the blind school due to other physical disfigurations and they were more comfortable studying with other visually impaired children. Sixty eight students with distance visual acuity of HM, PL and NPL (based on the exclusion criteria) were not referred for further low vision assessment since it was very unlikely that any refractive improvement would be seen. Thus 71 of the 139 students were referred to the LVC at UKM for further low vision assessment. Seventeen low vision students wore spectacles to begin with and their visual acuity with their spectacles on ranged between 6/18 and 6/60. After referral to the LVC at UKM it was found that 15 additional low vision students required corrections and spectacles were prescribed to them.

Near visual acuity

Near visual acuity could only be measured in 71 school children who participated in this study. The near visual acuity of these children ranged from N5 to N64. The near visual acuity of the other 68 children was not measurable with the reading chart used. Fourteen of these children had very poor vision such that they could not read the size N64 reading chart. Eighteen of 68 could only see light and 36 of them were totally blind. It was observed that when the distance visual acuity was poor, most of the time the near acuity was poor as well. However in some younger students

with good accommodation the near visual acuity was slightly better than their distance acuity. Figure 2 shows that only 29 of the students who participated in this study could read standard newspaper print sized text (N8). Indeed 94 students were unable to read even large print (N14). After provision of suitable low vision devices, there was a marked increase in the number of school children who could read. In total, 77 of the visually impaired school children were able to read standard sized newspaper print (N8) with appropriate LVDs. Low vision devices significantly improved reading ability (McNemar Test, $p<0.0001$).

Low vision devices

Table II describes the types of low vision devices owned by some of the school children and the types of low vision devices that were prescribed to them after the low vision assessment. Only eight of the school children who participated in this study owned their own devices. These devices were 4 hand held magnifiers, 3 stand magnifiers and 1 high addition spectacles. The reason why the students did not own or use LVDs were; (i) 26 students were unable to afford the purchase of the devices; (ii) 15 students had lost their devices; (iii) 13 students did not know how to use the devices; and (iv) 9 students did not like to use the devices. After referral to the low vision clinic, it was found that 48 school children benefited from the subsequent prescription of LVDs. The LVDs were 26 hand held magnifiers, 13 stand magnifiers, 6 high addition spectacles and 3 telescopes. The benefit from the subsequent prescribed low vision devices was assessed based on the students report on their ability to read with good reading speed and the usage of the devices during follow-up at the LVC. A majority of the school children who participated in this study were taught to use modification of reading distance, typoscope or extra lighting to read. Most of the school children preferred to use the hand held magnifiers (with or without illumination) compared to the stand magnifier types (with or without illumination).

DISCUSSION

The major causes of visual impairment in the low vision school children were congenital cataract (17%) followed by childhood nystagmus (15%), amblyopia (14%), retinal dystrophy (12%), glaucoma (7%) and corneal opacity (6%). These findings are similar to the key study of causes of childhood blindness in Malaysia conducted by Reddy and Tan (2001). In this earlier survey of 358 visually impaired school children across six special education schools in Malaysia, it was reported that the major causes of visual impairment in school children attending the special

Table I: Characteristics of low vision school children attending the special education schools in Malaysia

Category		No	Percentage (%)
Level	Kindergarten (5 – 6 years old)	2	1.4
	Primary (Standard 1 to 6) (7 – 14 years old)	23	16.6
	Secondary (Form 1 to Form 6) (14 – 20 years old)	114	82.0
Sex	Male	66	47.5
	Female	73	52.5
Distance Vision (aided)	Better than 6/18	2	1.4
	6/18 to 6/48	14	10.1
	6/60 to 6/120	30	21.6
	6/150 to 6/300	25	18.0
	Hand Movement	14	10.1
	Light Perception	18	12.9
	No Perception Light	36	25.9
Near visual acuity	N5	21	15.1
	N8	8	5.8
	N10	7	5.0
	N12	1	0.7
	N14	8	5.8
	N16	6	4.3
	N20	10	7.2
	N24	2	1.4
	N32	5	3.6
	N64	3	2.2
	Can't measure near vision	68	48.9

Table II: Number and characteristics of low vision devices owned and supplied to the students before and after low vision assessment

Type of devices	Number of low vision devices	
	Before low vision assessment	After low vision assessment
Spectacle magnifier	1	6
Hand magnifier (with and without illumination)	4	26
Stand magnifier (with and without illumination)	3	13
Telescope	0	3
TOTAL	**8**	**48**

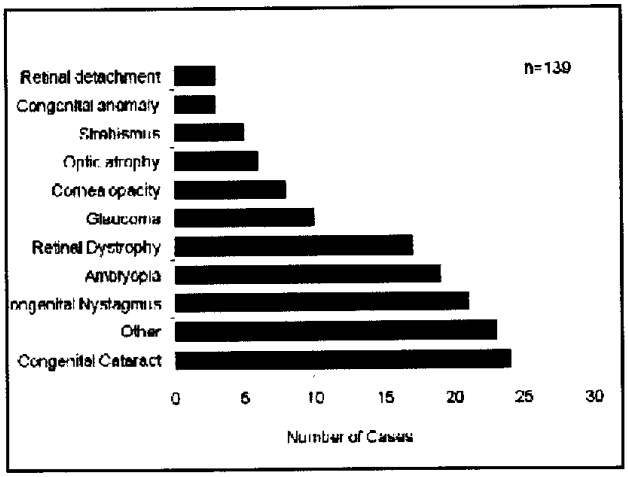

Fig. 1: Causes of ocular diseases among low vision school children

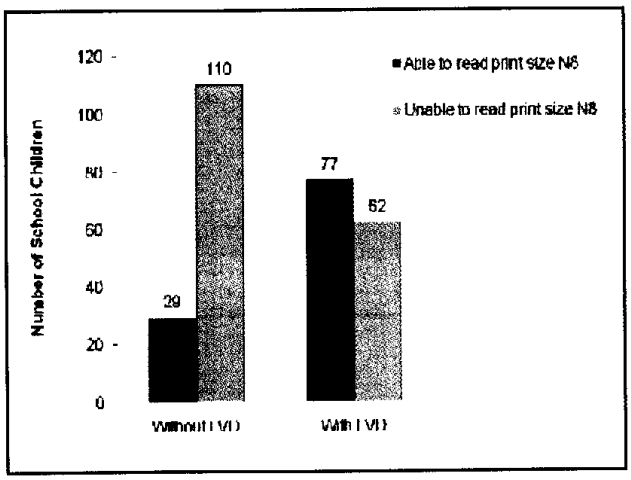

Fig. 2: Distribution of low vision students who could read newsprint (N8 or better) with and without low vision devices.

education schools were disorder of lenses where a majority of these school children had aphakia with associated amblyopia. However The National Eye Survey 1996 reported that the main causes of visual impairment in Malaysia were uncorrected refractive error (48%) and cataract (36%)[10]. Mohidin and Yusoff, (1998) conducted a retrospective study of 573 patients seen at the Universiti Kebangsaan Malaysia-Malaysian Association for the Blind (UKM-MAB) low vision clinic in Kuala Lumpur. In their study they concluded that the major causes of visual impairment in their younger group of patients attending the LVC were congenital and hereditary diseases and in particular congenital structural defects including nystagmus. Thus the current study supports previous studies in Malaysia confirming that the major causes of low vision in school children in Kuala Lumpur were congenital and hereditary eye diseases.

Our finding also showed that the majority of the low vision school children in this study fell in the registered blind category but have some form of useful or functional vision. This finding is consistent with previous studies [1,7,14,17]. A majority of the low vision school children in this study did not use or own LVDs. Some of the reasons reported by the students were; (i) the students were unable to afford the purchase of the devices; (ii) the students lost the devices; (iii) the students did not know how to use the devices; and (iv) the students do not like to use the devices. These issues need to be addressed so that these students can benefit from the low vision devices and use the devices to help them in their daily routine as students. Analysis in this study showed that LVDs used were able to significantly improve near acuity in these school children. Usage of LVDs among the school children will eventually reduce the disability or handicap faced by them. Hence this would improve their academic achievement and eventually they would in turn have better vocational achievements. A previous study had shown that educational and vocational achievement can be enhanced by low vision corrections[12].

The LVDs that were prescribed to the children were handheld magnifiers with and without illumination, stand magnifiers with and without illumination, spectacles magnifiers and also non-optical aids. Reading addition up to +3.00Ds was tried among the children but most of them do not like to use it due to cosmetic appearence, however a few of them accepted the spectacle magnifiers or high addittion lenses as it was possible to make the spectacle magnifiers cosmetically acceptable and as similar as possible to normal spectacles. LVDs would be able to assist these school children in reading smaller print and have better reading reserves. The low vision assessment can benefit these childeren through the prescription of the LVDs. The usage of LVDs would assist them with their daily routine as a student. This finding suggests the important role of optometrists in Malaysia to help reduce the disability and handicap experienced by children with low vision. In this study it was also found that the most common LVD used or being prescribed to these children was a hand held magnifier. This finding is consistent with previous study by Mohidin and Yusoff (1998) in their low vision population clinic study in Malaysia. However, other studies have found that stand magnifiers were commonly used in their studies[7,18,19]. Low vision students who were referred to the LVC at UKM were assessed and underwent a more detailed examination and it was found that 48 students could benefit from LVDs. The devices that were prescribed to these students were either spectacle magnifiers, hand held magnifiers (with or without illumination), stand magnifiers and telescopes. The acceptance of LVDs was found to be better with proper rehabilitation. This was especially noted during the follow-up session with the students. The rehabilitation here refers to the training and motivation of the student in the use of the device as well as the readiness of the prescribing low vision practitioner to tailor the prescription to the needs and tolerance of the student.

CONCLUSION

Students with low vision have special needs specific to their available vision. Uncorrected low vision conditions will restrict the students' education as well as their social and emotional development. Therefore students identified to have low vision require suitable expert assessment of their visual problems as well as appropriate low vision devices and rehabilitation prescribed. In this study we found that majority of the school children attending the blind schools in this study have residual vision. Congenital diseases and amblyopia were the major causes of visual impairment in these children. Therefore, it should be emphasized that early intervention whether surgical, medical or functional should be recommended to these children so that the visual disability can be reduced. Furthermore, education of parents on common causes of vision impairment and avoidable blindness should be addressed and this could be done through information brochures, informal talks at antenatal clinics etc.

LVDs are able to significantly improve near acuity in these school children and the most common low vision aids used and prescribed to these children were the hand held magnifier. Low vision rehabilitation can maximise the residual vision by using optical and non-optical devices. Optical devices such as magnifiers, telescopes have been shown to be able to assist children with reading and looking at distance respectively. Additive technologies such as Closed Circuit Television (CCTV), computers with voice synthesiser and screen enlargement effect will be able to assist the children with their daily activities as school children. The usage of the additive technologies should be encouraged at the special schools. This can be achieved by providing enough facilities at the special schools for each child. Additive technologies have been shown to be very useful even in normal school where computers have been use to facilitate teaching. For children with special needs some modification to the additive technologies can be done and learning can be much easier, interesting and more fun for them.

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