ORIGINAL ARTICLE

PAEDIATRIC LOW VISION: MAGNITUDE, INTERVENTIONS, DETERMINANTS AND COMPLIANCE

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ABSTRACT

Aim: To assess the low vision problem and its management along with impact assessment in paediatric population (children aged 0-16 years from blind schools and paediatric patients visiting the low vision department of a tertiary eye care centre).

Materials and Methods: In this cross-sectional study in which out of the total 3463 children from both the groups, 314 from blind schools and the 3149 from tertiary eye care centre in Pune a total of 113 children with low vision were assessed between October 1st 2007 and October 1st 2008. A complete low vision examination was done and appropriate aids were provided. Two follow up examinations were done at 3 and 9 months. Demographic information and entire assessment was done as per the modified WHO/PBL form for blind with low vision assessment and a questionnaire to assess the compliance.

Results: Out of 314 children from the schools for blind, 19.10%(60 number) were found to have low vision, majority having globe anomaly as the determinant and out of 3149 in the tertiary eye care centre 1.68% (53) were found to have low vision, majority with retinal lesions. All the children with vision <6/60 showed significant improvement in vision. In schools for blind, out of 52 who had vision <6/24, 35 (58.33%) improved to >6/24 range. In tertiary eye care centre, out of 49 who had vision <6/24, 24 (45.28%) improved to >6/24 range. After correction 61.7% in blind schools and 67.9% in the tertiary eye care centre had their near vision improved to the range of 1.5M – 1M.

Conclusions: Good screening, assessment and early management of low vision in children is important so as to help them become independent citizens and reduce the load of visual impairment.

Keywords: Low vision, Screening, Vision 2020

INTRODUCTION

The World Health Organization estimates 161 million people worldwide have a visual impairment. Of these, 37 million are blind and 124 million have low vision (World Health Organization, 2000). More than 90% of worlds visually impaired live in developing countries like India. The working definition of low vision used will be as given by WHO in 1992 i.e. – A person with low vision is one who has impairment of visual functioning even after treatment and/or standard refractive correction, and has a visual acuity of less than 6/18 to light perception , or a visual field of less than 10 degrees from the point of fixation ,but who uses ,or is potentially able to use vision for the planning and /or execution of the task for which vision is essential.[1] The problem of low vision has come in limelight at international level attracting attention of the global initiative VISION 2020: The Right to Sight. About 90% of the world's blind live in the developing world. It is estimated that there are 9-12 million blind in India, which amounts to about one-fourth of all the blind people worldwide. More than 12 million children aged 5 – 15 years worldwide are visually impaired. This study is an attempt to reach out to screen and treat children with low vision so as to help them use their residual potential vision to the best and lead a better quality life.

METHODOLOGY

This is a cross-sectional study wherein comprehensive data was collected from children aged 0-16 years, attending schools for blind in and around Pune and those with low vision examined in a tertiary eye care centre, between November 1st 2007 and September 1st 2008. Entire examination was done by a team of

ophthalmologists, low vision specialist, optometrist and retina specialist. Data collected comprises clinical and demographic details and educational status. Case record includes a special modified version of WHO/PBL eye examination record for children with blindness; including entire low vision assessment. Complete visual assessment was done. Dry retinoscopy was done and whenever needed radical retinoscopy at reduced working distance / wet retinoscopy were performed. Visual acuity was tested using the Lea symbol charts for near and distance. Contrast sensitivity was assessed using Hand Held Low Contrast Flip Chart with Lea symbols. Contrast sensitivity measures the ability to see details at low contrast levels. The decision of prescribing a monocular or binocular aid was taken first depending on the results of acuity and contrast testing and also considering the difference between the two eyes along with the binocular interactions. Anterior segments of the eyes were examined using a torch and / or handheld slit lamp. The posterior segment was examined using a direct ophthalmoscope and indirect ophthalmoscope after dilatation of pupil.

The amount of magnification needed was determined by the following formula:

Magnification = Best visual acuity / Target acuity

For near: Kestenbaum method was used. Appropriate spectacle and low vision aid (optical and/or non optical) were provided based on the needs with specific training to use them. Compliance was checked by observation in the follow up (whether child was wearing/using the aid or not) and by verbal questions regarding the reason for not using the aid. Assessment of outdoor and indoor activities was done by means of leading questions related to mobility, recognition of faces and objects, own daily routine work, playing, art work (cane work) was also done. The quality of life was assessed on the basis of the changes noticed in mobility, recognition and other outdoor, routine and vocational activities.

Two follow up examinations were done at three months and nine months respectively from the first examination.

Permission was obtained from ethical committee of the institutional to conduct the study. Informed written consent of the participants was taken. The data was entered into a database and analyzed using SPSS (statistical package for social sciences), version 16.0 statistical software for Windows. Chi square test and t test was applied wherever applicable.

RESULTS

In the schools for blind out of 314 children 60(19.1%) children and in the tertiary eye care centre out of 3149 children attending the pediatric OPD oven 1 year period, 53(1.7%) were found to have low vision. (Table1)

Majority of children from the schools for blind, i.e. 51.7%, had whole globe anomalies like microphthalmos as the determinant of low vision followed by retinal causes like heredomacular degeneration etc (28.3%) and others. On the other hand, the majority of children from the tertiary eye care centre had retinal lesions as the determinant of low vision followed by whole globe anomalies. (Table 2)

All the children from schools for blind were given optical and non optical aids. Only 7.5% of children from tertiary eye care centre showed no improvement with aids tried.

Table 1: Sample population description

Type of population	Children examined	Children with low vision (%)
Blind schools	314	60 (19.10)
Tertiary eye care centre	3149	53 (1.68)
Total	3463	113

Table 2: Various determinants of low vision according to anatomical site involved

Determinant / diagnosis	Blind schools	Tertiary eye care centre (%)
Whole globe	31 (51.7)	14 (26.4)
Cornea	2 (3.3)	1 (1.9)
Lens	6 (10%)	0
Retina	17(28.3)	25 (47.2)
Optic nerve	1 (1.7)	6 (11.3)
Trauma	0	1 (1.9)
Amblyopia and refractive error	3 (5)	6 (11.3)

In the schools for blind, 16.7% children improved to the 6/18-6/9 range of distance vision. All the children with vision (less than) <6/60 showed improvement in vision. Out of 52 children who had vision <6/24, 35 (58.33%) improved to equal to or (more than) >6/24 range. This is statistically significant by t-test, p value <0.01. In the tertiary eye care centre, 15.1% children improved to the 6/18 - 6/9 range. 10 of 18 children i.e. 18.86% with vision <6/60 showed improvement in vision. Out of 49 who had vision <6/24, 24 (45.28%) improved to >6/24 rangewhich is statistically significant by t test with p value <0.05. (Table 3) After correction, 61.7% in blind schools and 67.9% in the tertiary eye care centre had their near vision improved to the range of 1.6M – 1M (N12-N8). This is statistically significant with p value <0.05 by t-test.

In schools for blind: Out of 60 who were given aids, only 8.3% broke their aids while 2 (3.3%) found it difficult to use the aid, 3 (5%) left the aid somewhere.

Table 3: Improvement in Distance vision & Near Vision Unaided

Vision	Blind School		Tertiary Eye Care Centre	
	Before correction (unaided)	After correction	Before correction (unaided)	After correction
Distance Vision				
< 6/60 – PL	21 (35.0)	0	18 (34)	8 (15.1)
6/60 -6/24p	31 (51.7)	17 (28.3)	31 (58.5)	17 (32.1)
6/24 - 6/18p	8 (13.3)	27 (45.0)	4 (7.5)	18 (34.0)
6/18 - 6/9	0	10 (16.7)	0	8 (15.1)
No Improvement		6 (10.0)		2 (3.77)
Near Vision Unaided				
< 8M	0	0	2 (3.77)	0
8M – 4M	24 (40)	8 (13.33)	13 (24.5)	14 (26.41)
3M – 2M	28 (46.7)	13 (21.7)	24 (45.3)	3 (5.7)
1.5M – 1M	8 (13.3)	37 (61.7)	14 (26.4)	36 (67.9)
No Improvement		2 (3.33)		0

This suggests that only 5 children were probably not very happy with the aid. In tertiary eye care centre: only 1.9% found it difficult to use the aid and another 1.9% broke the aid. 96.7% children from schools for blind and 92.5% from tertiary eye care centre were dependent in their mobility but with the use of aids provided 61.7% from the schools for blind and 52.8% from the tertiary eye care centre became independent. 58.3% children from schools for blind and 35.8% from tertiary eye care centre could comfortably play outdoors with the aids provided. 5% children from schools for blind and 7.5 % from the tertiary eye care centre could cross the roads independently with the aids provided. With regular use of aids: 35% children from schools for blind and 45.3% from the tertiary eye care centre learnt to read. 63.3% children from schools for blind and 50.9% from the tertiary eye care centre started to recognize faces and objects at 3m. 61.7% children from schools for blind and 41.5% from the tertiary eye care centre could wash and maintain their clothes better with the aids.

DISCUSSION

This study presents data on the magnitude, determinants and interventions in the sample population of children with low vision from schools for blind and a tertiary eye care centre. The distribution of the study population according to age showed that most of the patients of low vision were in the age group of 10 – 16 Years as compared to those in the age group less than 10 years. According to the study of Gilbert CE et al in school age children, functional low vision increased with age.[2] The various determinants of low vision in children seen in the schools for blind consisted mainly of whole globe problems (51.7 %) followed by retinal lesions (28.3 %), whereas in the tertiary eye care centre, it consisted of retinal lesions (47.2 %) followed by whole globe anomalies (26.4 %). Study of the temporal trends of severe visual impairment/Blindness by comparing causes in children in three different age groups-5-8 years, 9-12 years, and 13-16 years-suggests that retinal disorders have become more important. The whole globe (27.4%), cornea (21.7%), and retina (15.1%) were found to be the most frequent sites of abnormality. Congenital ocular anomalies (mainly microphthalmos, anophthalmos) accounted for 25.8% of severe visual impairment / Blindness. The retinal disorders being identified as important is in agreement with the results in our tertiary eye care center study group.Similar findings have been reported from other institution based and population based studies in India by Titiyal JS et al and Hornby S et al.[3,4] Congenital anomalies may be due to genetic diseases or intrauterine factors, but in the majority, the etiology is unknown. Similar results were seen in the study by R Sitorus et al in Indonesia where whole globe anomalies were the major determinant of low vision.[5] The most commonly given optical devices were distance correction spectacles (53.3 %) in schools for blind; 41.5 % in tertiary eye care center) and then, bifocals (12%) in schools for blinds. In the two study groups, 61.7 % and 67.9 % children respectively, could read 1.5 - 1M (N10 – N8) print. This was in agreement with the study of Pal N et al in which out of 124 children with low vision but having useful residual vision, 51 (41.1%) were able to read N-10 unaided or with distance spectacles and 30 children (22.6%) improved to N-10 with spectacle magnifiers and were prescribed the same.[6] Our study differed in that low vision children were not very happy with the improvement they gained with magnifiers as compared to other studies. Thus, it was observed that majority of children in blind schools (53.3%) and tertiary eye care centre (41.5%) accepted spectacles (distance correction) as optical aids. Results similar to our study were seen in the study of Silver J et al; forty six per cent of students with low vision (n = 64) could read N5-N8 print unaided or with spectacles, as could a further 33% (n = 46) with low vision de-

vices.[7] A study by Hornby SJ et al showed that 15.4% were able to read N10 point though they were studying Braille.[4] In our study only 7.5% children from the tertiary eye care centre showed significant improvement with telescopes which is quite less as compared to other studies like one from the blind schools of Nepal by Kansakar I et al.[8] The compliance in terms of follow up rate was good in 83.3% and 62.3% from the schools for blind and tertiary eye care center respectively. These children were not only present during the first follow up but 66.7 %; 58.5 % from the two groups respectively were also using the aids provided. This indicates the satisfaction and improvement in the quality of life of these children. Independence in mobility was seen in almost all the children using the aids regularly. Good improvement was observed in the outdoor and routine activities. Significant improvement in craft work was also noted. Similar results regarding satisfaction with low vision aids was seen in the study by Rohrschneider K et al.[9] As far as non optical devices were concerned, additional illumination in the form of overhead table lamp or window light was helpful in 80% and 79.2% children in the two study groups respectively, while a Reading stand was the preferred aid in 86.7% and 64.2% children respectively. In the second follow up, 51.7% children from the schools for blind and 66% children from the tertiary eye care center were found to be using the aids regularly. The lower percentage of children using aids in the blind schools probably indicates that over a longer period of time, more attention was paid to the children in the tertiary eye care center. This also implies that the needs of children in schools for blind may have been neglected by teachers/guardians ,whereas in the second group, it was the parents/close relatives who were taking care and were, therefore, more cautious.

Thus, Low vision/ "partial sight" can be managed well with low vision services thereby improving the quality of life of children with low vision. Thus, it is important to screen out patients of low vision from blind schools to provide them with appropriate aids. More so in children as early management and provision of aids will help them cope with their daily needs, social and educational needs as well. This will enhance their performance in school and develop their self confidence. And help in their social acceptance and thus enlighten their dark world. Our study, thus, emphasizes on the great need of proper screening of children in blind schools and tertiary eyecare centres/clinics for low vision and appropriate management with refraction and low vision services.

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