Original Article

Low vision device requirements among children from two schools for the blind in Tamil Nadu

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Purpose: To identify children with low vision from two local schools for the blind, to provide low vision devices (LVD) to those who may benefit from it, and to encourage them to learn print. **Methods:** A prospective study was conducted among children from two local schools for the blind. Best-corrected visual acuity (BCVA) was done using the Snellen chart. Children with BCVA of counting finger (CF) 1/2 meter or more in the better eye underwent low vision assessment. Distant vision was assessed using the Feinbloom chart and near vision was assessed using the Lea symbol chart. Low vision devices (LVD) were prescribed as required. **Results:** Among 185 children enrolled, 31 children had BCVA of >CF ½ meter. Using a telescope, distant vision was better than 3/36 in 48.4%, 3/36–3/12 in 16.2%, and 3/9.5 to 3/3 in 35.4%. Among 23 children who read 1M at <10 cm, 22.6% could read 0.6–0.8M, and 25.8% could read 1M using LVD. **Conclusion:** Regular screening of children in schools for the blind could identify children who might benefit from LVD. A review of protocols for the entry of children in schools for the blind by screening these children by a specialist team prior to admission should be made mandatory.

Key words: Braille, low vision devices, schools for the blind

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Braille alone is taught in most schools for the blind with the assumption that children enrolled belong to the category of "blind", hence will not be able to read print. Though vision <3/60 is defined as blind, children may benefit from low vision devices (LVD) and can be taught to read and write print. Screening children from schools for the blind is essential as children with low vision might get enrolled in these schools. Two studies have been reported from India on children from schools for the blind; Gogate *et al*. reported 0.06% (26/428) children could read print with LVD.[1] Hornby reported that 19/99 (0.19%) had vision better than 6/18.[2]

The aim of this study was to identify children with low vision from two local schools for the blind, to provide low vision devices (LVD) to those who may benefit from it, and to encourage them to learn print.

Methods

A cross-sectional study was conducted from June to November in 2015 and 2016 thus spanning 12 months. Children from two local schools of the blind were enrolled after obtaining permission from the Institutional Review Board (IRB) and the ethics committee as well as the school authorities. The first school, located 3 km from the base hospital is a government school, which provided only Braille for teaching. The second school is located 40 km away from the base hospital, has separate schools for the blind and sighted. Children with visual impairment attended their regular school to learn lessons through scribe method from class 5 onwards. Informed consent and assent when feasible was obtained from all children as well as parents, who were willing to participate in the study.

The assessment was done in two steps: In the first step, all children underwent best- corrected visual acuity (BCVA) and complete ocular examination. Among them, all those who had BCVA better than counting fingers (CF) ½ metre (m) were advised low vision assessment and were included in the study.

Children from the nearby government-run school for the blind underwent low vision assessment at the base hospital while students in the second school were assessed both in the school and at the base hospital. A team comprising ophthalmologists and optometrists visited the schools on days allotted by the school authorities for low vision assessment and rehabilitation.

Children enrolled in these two schools, aged <18 years underwent BCVA assessment using the Snellen chart. During low vision assessment, distant vision assessment was done using the Feinbloom chart at 3 m. Based on requirements, distance vision chart distance was reduced from 3 m to the required distance. For those with vision less than 1 m, the CF vision assessment method was also used. Near vision assessment was done using the Lea symbol or number chart with metric (M) notation, with matching method when required.

All children who had BCVA better than CF ½ m underwent low vision assessment. Various LVDs for distance and near were

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used. Handheld telescope of 2×, 2.5×, 3×, 3.2×, and 4× were tried based on a child's distant vision. For near vision, LVD of varying diopter (D) like hand magnifiers of +6D, +14D, and +20D, non and self-illuminating stand magnifiers of + 8D, +14D, +20D, dome magnifiers (2× and 4×), and magnifying sheets were used. The power of distant and near LVD required for each child was calculated based on a child's vision. Nonoptical devices including reading stand, good illumination, ruled books, black felt pens and increased print size were advised for all who had the potential to read or write. Among children with significant refractive error having improvement in vision, spectacles were issued free of cost. LVD were advised and given for each child based on the improvement in vision as well as the child's acceptance and comfort for reading.

Children who could read print were encouraged to learn print. Children who had been to regular schools before enrolment into the blind school and could read print were encouraged to continue learning print along with Braille. Teachers were given training in the base hospital to help and encourage partially sighted children to use LVDs to read and write. The schools were provided with a kit of LVDs to start a library of LVD. This was done to encourage children with low vision to read print during school hours. Descriptive measures such as percentages and frequencies were presented for categorical variables. SPSS version 21 was used for data analysis.

Results

One hundred and eighty-five children in the two schools for the blind were screened; 86 (46.49%) were from the local government school and 99 (53.51%) were from the private school. Among them, 31 (16.7%) had BCVA of >CF ½ m and underwent low vision assessment; their age ranged from 6 to 18 years, with a mean age of 12.9 (± 3.44) years. Only 4 children in the study subjects were below 10 years. Twenty-one (67.7%) children were male.

BCVA and improvement in distant vision using Feinbloom chart using telescope 3×/4× is shown in Table 1. Near vision assessment was done using M notation. Eight (25%) children could read unaided the normal print size 1M, at a distance of 10 cm or more [Table 2]. Twenty three children could read 1M closer than 10 cm only. Improvement in near vision in these 23 children using LVD ranging from 6D to 20D is shown in Table 3. Among 185 screened, eighty- one children had been to regular school before joining schools for the blind. Various LVD were prescribed to children based on their acceptance of the device and comfort, as shown in Table 4.

Discussion

Entry to schools for the blind depends on reports issued by an ophthalmologist. All children included in our study had consulted an ophthalmologist and were certified to have an ocular pathology and poor vision prior to admission in the schools for the blind. Children with poor vision noticed from birth or early childhood joined the blind school directly while others with low vision got enrolled in the blind school after being in a regular school until the visual impairment was recognized by teachers/parents. Though admission protocols were strictly followed in both the schools, children with low vision were also enrolled in these schools. A reason could be that hospitals entitled to give certification on vision prior to admission in schools for the blind may not have the requisite facilities for vision assessment specifically needed for children.

Inadequate resources and lack of proper vision assessment can result in children with low vision getting admitted in schools for the blind inappropriately. However, based on the Rights of Persons with Disabilities Act (RPDA) 2016, children with low vision deserve the right to inclusive education.[3] With advances in subspecialties in ophthalmology, children should be assessed in institutions with a trained pediatric optometrist/ophthalmologist. Specific vision assessment gadgets are required for assessing preverbal, verbal nonschool going, and school-going children. Children might show an improvement in vision when there is better cooperation and good rapport with the assessor, hence more than one visit may be required before documenting vision in a child. If these measures can be strictly implemented by eye health care workers, it will prevent the erroneous enrollment of children with low vision into schools for the blind and ensure better compliance with the RPD Act.[3]

Eighty-one children had been to regular school before joining schools for the blind in our study. This necessitates parental education and improvement in awareness on dealing with their children with low vision. Children with nonprogressive ocular pathology and low vision who got exposed to reading and writing for a few years in regular school might benefit from LVD. Given adequate training, these children have the potential to continue learning print due to prior exposure to print. Shifting these children back to regular schools is not an option as they would have lost speed in reading and writing to keep up with the regular school curriculum.

Sarva Shiksha Abhiyan (SSA) system in each locality is expected to cover all regular schools to help children with various morbidities including low vision. However, some schools lack coverage, hence children with low vision find it difficult to integrate into the regular-stream.

The integrated system of education in schools for the blind has been implemented in developed countries and is emerging in many developing countries, including India. There are reports on sighted children from integrated schools for the blind from developing countries.[4-7] Similar to our study, Kansarkar

Table 1: Distant vision, unaided and using telescope 3×/4× (*n*=31)

BCVA (Snellen chart)	Vision (Feinbloom chart)	Without telescope *n* (%)	With telescope (3×/4×) *n* (%)
CF 1/2 m-3/60		16 (51.6)	
>3/60-5/60	>3/36	11 (35.4)	15 (48.4)
6/60-6/24	3/36-3/12	4 (13)	5 (16.2)
6/18-6/6	3/9.5-3/3	0	11 (35.4)

Table 2: Unaided near vision

Distance at which 1M was read	No. of children who read 1M unaided (%)
≥10 cm	8 (25.8%)
<10 cm	23 (74.2%)
Total	31

Table 3: Near vision using low vision devices

M notation	*n* (%)
0.6-0.8	7 (22.6)
1	8 (25.8)
2	2 (6.45)
>2	6 (19.35)
Total	23 (74.2)

Table 4: Types of low vision devices prescribed

LVD for distant vision	*n*=51 (100%)
Spectacles	14 (27.4%)
Telescope (2-2.5×)	13 (25.5%)
(3-3.2×)	5 (9.8%)
4×	1 (2%)
LVD for near vision	
Hand magnifier	12 (23.5%)
Stand Magnifier	1 (2%)
Dome	4 (7.8%)
Magnifying Sheet	1 (2%)

et al. and Silver *et al*. have reported on sighted children studying in schools for the blind in developing nations.[8,9]

Pal *et al*. and Gogate *et al*. have reported the use of LVD among children in schools for the blind in India.[10,11] Our study showed that among the 31 children who could see up to CF ½ meter or more, approximately 75% could read normal print with the help of LVD. We provided free LVD to both schools, which included hand and stand magnifiers of various diopters. We helped schools to establish a LVD library, to encourage children to read printed textbooks during and after school hours using the LVD provided.

We also noticed that as children grow, their cooperation improves. This will help in documenting better vision and necessitates periodic/yearly vision assessment in these schools by a low vision team.

Conclusion

In our study, 16 (50%) of children having vision CF ½ or better, could see up to 6/60 with aid of LVD. Also, 80% (25/31) of children with vision of >CF 1/2 could read up to 2M with LVD. This demonstrated how LVD in children with low vision can help improve their functional vision, both for distance as well as near.

The findings of this study demand a review of the protocols for entry as well as the regular screening of children in schools for the blind. Providing low vision assessment, LVDs and by training teachers to encourage children to learn print should be a routine in all schools for the blind. This will help children with low vision to improve their quality of life.

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Conflicts of interest

There are no conflicts of interest.

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