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Present Utilization and Underline Barriers of Low Vision Devices among Ten Blind Schools in the Province of Punjab, India

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ABSTRACT

Background: Low vision devices (LVDs) are important for improving functional vision and participation in daily activities of partially blind students studding in Blind Schools, despite of that many partially Blind school students are not using Low vision devices.

Aim: of this study was to observe the current usage of low vision devices (LVDs) among blind school students in Punjab, India.

Methodology: A survey was conducted among ten schools for the blind in Punjab. A total of 403 blind students in the age group of 10 to 24 years, with a mean age of 17.10 years and SD ±3.4, participated in the study. The team carefully recorded all of the students' vision and ocular history, including family and systemic health, and performed an assessment of visual acuity using the Log MAR chart. Low vision devices trail was conducted for students who were partially blind. The **results** of this study showed a significant gap in the use of low vision devices among schools for the blind, despite evidence of their effectiveness in improving visual outcomes and education.

Conclusion: The present study concludes that the utilization of LVDs among blind school of Punjab is significantly low hence the study suggests blind school administration should do periodic Low vision assessment in blind schools, barrios such as affordability, availability of LVDs and training of low vision devices among partially blind students and special educators is a point of concern.

Keywords: *Low Vision devices (LVDs), Blind Schools, Partially Blind Students.*

1. INTRODUCTION

According to the estimations provided by the World Health Organization (WHO) in their Global Data on Visual Impairments 2010 reports shows that there are 39.365 million blind individuals present in the world [1]. As per the current WHO report of 2023, globally 2.2 billion people are visually impaired. Around 8.075 million of them are in India. This accounts for approximately one-fifth of the global blind population [2]. The Ministry of Health and Family Welfare conducted the Rapid Survey on Avoidable Blindness as part of the National Programme for Control of Blindness (NPCB) in 2006–2007, revealing a 1% frequency of blindness in India, based on the NPCB's definition of visual acuity of less than 6/60 [3]. The Kapurthala district of Punjab, India conducted a blindness survey under the National Program of Control of Blindness and Vision Impairment. The survey found that the prevalence of blindness was 2.5%, compared to the national average of 1.99%, and 11.53% of the population had low vision, defined as a visual acuity of less than 6/18 in the better eye. Blindness survey of Kapurthala found functional low vision prevalence was 2.4% [4]. The current prevalence of blindness in children is known to be around 0.8/1000, as the prevalence of blindness among children is relatively lower in comparison with adults [5]. The history of special education in India for people with vision impairments has been less good than the history of special education for people with other disabilities. Miss Annie Sharp's efforts established Amritsar's first school for the blind in 1887[6]. By 1944, private groups managed most India's 32 schools, receiving subsidies from the state government. Between 1951 and 1979, India constructed a total of 104 schools, indicating a rise in special education since the country's independence. In 1979, the government established a National Institute for the Visually Handicapped in the city of Dehradun, following its efforts during the years 1973 and 1975 [7]. In 2016, India had a total of 973 facilities that provided special

education. In 1986, the Rehabilitation Council of India (RCI) established itself as a registered society, and the Choice to Education Act significantly contributed to the inclusion of children with disabilities and the provision of free and compulsory education [8]. There is evidence to suggest that using low-vision devices for blind students is one of the most significant approaches to improving students' ability to live independently and to maximize their educational potential [9]. A multitude of studies conducted in many parts of the world have demonstrated that the utilization of low-vision devices and assistive technology has the potential to increase and develop academic abilities, including fine and gross motor skills, reading and writing capacity, mathematical and scientific ability, and problem-solving skills, among children who have visual difficulties [10]. Around the world, the prevalence of vision impairment is increasing on a yearly basis. Children who are visually impaired have to overcome a multitude of obstacles, which adversely affect their quality of life. As a result, the requirement for low vision is essential for those enrolled in blind schools [11]. Despite a wealth of evidence demonstrating a significant improvement in the functional vision of blind school students using low vision devices, there remains a gap in their implementation [12]. The present study aim is to observe the current usage of low vision and assistive devices among blind school students in Punjab. incurable, chronic illness that requires strict adherence to medical treatment regimen and the objective of diabetes management is to maximize comfort, diminish symptoms, and prevent complications (Id et al., 2019). To attain these

2. METHODOLOGY

Fifteen blind schools were approached in Punjab for low vision evolution; eleven of these schools were operational, and we sought permission from all functioning institutes. Out of these eleven institutions, ten granted the permission. A cross-sectional study was conducted among ten different blind schools. A total of 403 blind students were enrolled in the study, ranging in age from 10 to 24 years, with a mean age of 17.10 years and SD ±3.4 studding in blind schools. The Institutional Human Ethical Committee (IHEC) EC/NEW/INST/2023/531/180 of Chitkara University, Rajpura, Punjab, granted the study ethical approval. Children's examination was conducted in the presence of their respective teachers, obtaining parental consent in advance for students under 18 and informed consent for those over 18. The purpose of the research is to conduct a comprehensive low-vision examination of blind children enrolled in schools for the Blind to determine appropriate solutions. To conduct a comprehensive examination of the students, a group consisting of ophthalmologists and optometrists went to the blind schools. The group meticulously documented all the students' visual and ocular histories, including family and systemic health and evaluation was done for visual acuity test, employing the Log MAR chart and the tumbling E chart [13]. Children who were unable to interpret the E chart or Log MAR chart at a half-meter distance also had their perception of light evaluated with a torch light. As part of the inspection of the anterior segment Slit lamp was used and Posterior segment with indirect ophthalmoscope [14]. Following the visual and ocular examination of all students; the students who were following under the WHO low vision category, a detailed low vision evaluation was conducted, which included a history of previous low vision devices, best corrected vision, objective refraction by retinoscopy, subjective acceptance, and a functional vision assessment of color vision, contrast, visual field, and mobility [15]. After evaluation both distance and near-optical low vision devices trail was done for blind students, further the findings were statistically evaluated with the help of IBM SPSS 29.0. The complete evaluation was conducted in Blind school’s premises and in the presence of special educators of blind schools. An informal interview was also conducted to understand the reasons for underutilization of the LVDs.

3. RESULTS

There was a total of 15 blind schools in Punjab, India, 11 of which are functional, 4 were not operational. Permission for Low vision screening was sought from all functioning Blind Schools, out of eleven functioning school, ten of them has given permission *figure 1.* illustrate the pattern of low vision students among blind schools. 10 blind school had total of 403 students, 110 students were low vision and 293 were blind.

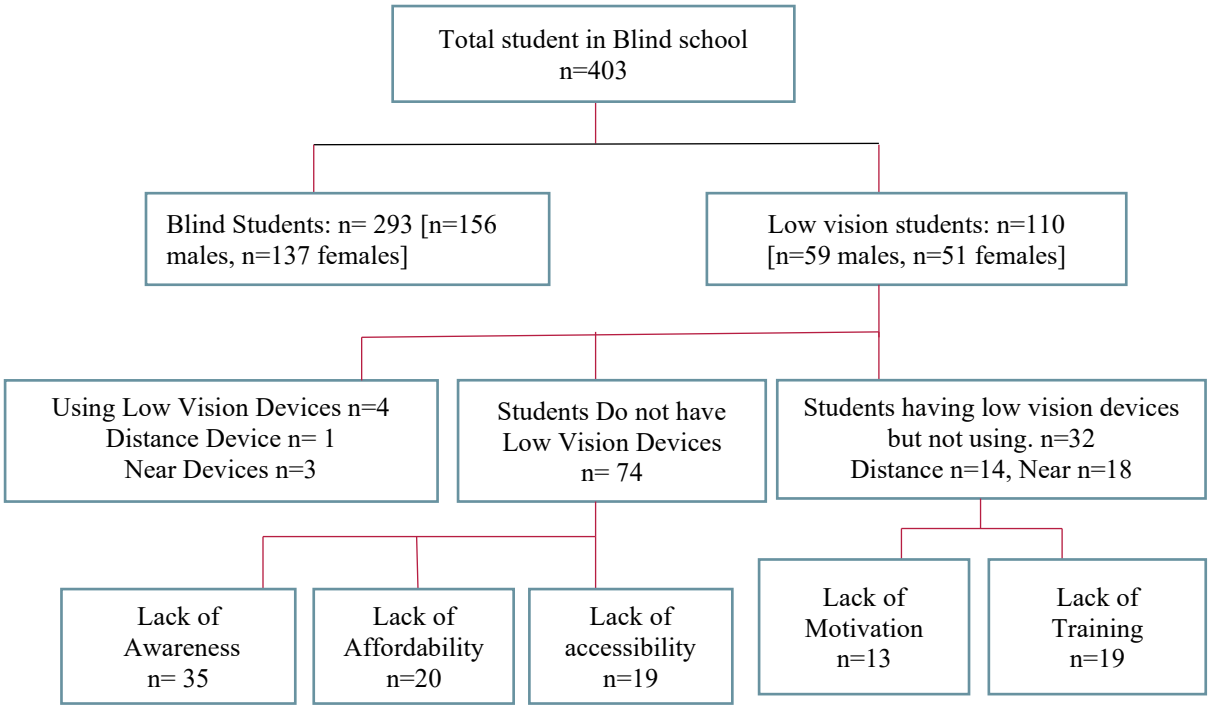

Figure 1. Illustrate blind students following under low vision categories and current utilisation of Low vision devices.

Table1. Distribution of Blind school students as per WHO criteria (n=406)

Visual acuity in the better eye	No. of students
6/6-6/18 (no VI)	0
6/24-6/60 (Moderate VI)	49
<6/60-3/60 (Severe VI)	61
<3/60-light perception(blind)	108
No light perception	185
Total students	403

VI=Vision Impairment, WHO=World Health Organisation**

*Less than 6/18, follows under Low vision moderate to Severe VI**

The student was furthermore categories based on WHO classification of Blindness, the distribution is elaborated in *Table 1.* Whereas *Table 2* shows different type of ocular diseases leading to vision impairment among ten blind Schools

Table.2 Ocular Diseases Leading to Vision Impairment in Blind Schools

Ocular Disease	no. of Cases in 10 Blind schools n=406	Percentage of Disease found in 10 Blind Schools
Cataract	90	22.3%
Macular Disease	17	4.21%

Corneal Opacities	35	8.68%
Retinal Detachment	53	13.1%
Retinitis Pigmentosa	53	13.1%
Glaucoma	89	22.0%
Optic Atrophy	32	7.94%
Best disease	16	3.97%
Albinism	18	4.46%
Total	403	

Total 403 students were studding in blind school out of them 110 were following under low vision category as shown in *figure 1.* The normality of visual acuity data was evaluated with shapiro wilk test, the data was not normally distributed. After using low vision devices visual acuity for distance and near was evaluated and comparison was done with the Mann Whitley U test for OD distance visual acuity U=2701 z-score was 7.22 and p-value was < .001. OS distance visual acuity U= 3248 z-score was 6.08 and p-value was < .001. Visual acuity was statistically and clinically improved with Low vision devices. Near visual acuity OD U= 1478 z-score was 5.01 and p-value was < .001, OS U= 1587 z-score was 5.08 and p-value was < .001. Near Low vision device also showed significant improvement. The existing and new user of low vision devices is shown in *Table 3*.

Table 3. Details of Existing and first time used Low vision devices used by Blind School Students.

Existing Low vision Device user in blind School n=4	
Type of LVD	Number of Students
Monocular Telescope [4x]	1
Handheld Magnifier [4x]	3
Blind School students have devices, but they are not using n=32	
Monocular Telescope [4x and 6 x]	15
Hand Magnifier [4x, 6x and 8 x]	17
Blind School students who are using Low Vision Devices first time n=74	
4x Telescope	9
6x Telescope	7
See TV [2.5 x] binocular telescope	9
Stand Magnifier 6x	7
Stand Magnifier 8x	1
4x Telescope and Pocket Magnifer3x	5
6x Telescope and Pocket Magnifer3x	2
4x Telescope and Stand Magnifier 6x	11
6x Telescope and Stand Magnifier 6x	4
6x Telescope and Stand Magnifier 8x	2
4x Telescope and stand Magnifier 8x	3
4x Telescope and Hand Magnifier 3x	7
6x Telescope and Hand Magnifier 3x	4
Spectacles	3

4. DISCUSSION

The present study aimed to assess the current utilization of low vision devices (LVDs) among ten blind schools in Punjab, India. The findings offer critical insights into the extent to which LVDs are being employed in these institutions, the challenges encountered by users, and the institutional factors that influence their accessibility and effectiveness. Current Utilization of Low Vision Devices; Present research revealed that the utilization of LVDs in blind schools across Punjab is significantly varied, 27 % students were low vision from 10 blind schools of Punjab India, out of this students only 4 students were using LVDs very few were utilizing LVDs which is corresponding with Chavan Amruta *et.al.,* [16] study were the respective study conducted in 2023 indicates that Blind school students visual acuity do improve with LVDs but utilization of them is poor. While some schools had access to basic LVDs, such as magnifying glasses and braille displays, more advanced devices, like electronic magnifiers and screen readers, were either underutilized or unavailable. The availability of LVDs appears to be linked directly to the financial resources of the institutions, as well as the level of awareness among administrators and educators about the potential benefits of these devices the present study 110 students were improve with LVDs, but unfortunately 67% of them had never used LVDs, affordability, awareness and accessibility was observed as its mention in *figure 1* the current study finding resembles Wardaah Afzaal *et.al.,* [17] study conducted in the year 2022 indicated that affordability and availability of LVDs is a concern. Many students with residual vision were found to benefit from magnifying devices, but their long-term usage was limited due to a lack of training and follow-up services. In schools where devices were available, they were often underused, primarily because teachers were not adequately trained to integrate LVDs into their teaching practices, in the current study out of 110 low vision patient studying in blind school 32 had LVDs, but still they were not using them the reason was lack of training and motivation the current study results corresponds with Albert Tousif Israfil *et.al.,* [18] study. Present study findings highlight the critical role that teachers and support staff play in promoting the use of LVDs. Schools where teachers had received specialized training in visual impairment and assistive technologies saw better utilization of devices. On the contrary, in schools with limited teacher training, devices, if available, often remained unused or were not integrated effectively into the curriculum. In this study, there are several obstacles to the proper use of LVD. These barriers can be grouped into administrative, economic and social ones. The first barrier identified was lack of teacher education and training. Many schoolteachers were not familiar with LVDs or how to use them in the classroom. This educational space prevents students from using the available tools. In addition, there was a lack of professional support, such as vision rehabilitation specialists, to help students and teachers use these devices properly. Without proper guidance, students find it difficult to adapt to these aids and end up abandoning them, in present study 17 % blind students were not using LVD because of lack in training the results do corresponds with M W Charles study [19] on teacher skills needed for training leaners to use low vision devices conducted in the year 2021. Another problem is the old infrastructure in many schools, which makes it difficult to use advanced LVDs. Social barriers, unawareness of students and their families about the benefits of LVD can be a barrier. Most students, especially those from rural areas, have little understanding of how these tools can improve their learning outcomes. Cultural stigma around disabilities can prevent students from using these tools, because they fear rejection or ridicule from their peers. Another social barrier is the self-perception of limited vision. In some communities, low vision is misunderstood or equated with total blindness, due to the lack of appropriate interventions for people who can benefit from LVDs. As a result, many partially sighted students do not have access to assistive technology to enhance their abilities, social stigma was observed in the present study with corresponds well with Sivakumar P, *et, al.,* [20] study where the respective author has explained about LVDs related stigma in the year 2020. There are other findings observed in the survey such as Ocular disease leading to vision impairment in Blind Schools, the disease type corresponds with Bhalerao SA *et. al.,* study [21] but at the same time percentage of disease following do differ. Although Visual acuity was improving in the present study still blind students were not utilizing them, the results are supported by Israfil *et al.,* study [18]. This present survey is part of a longitudinal Blind School study contacted by present author, where the present author has evaluated perception of low vision rehabilitation among special educators via a survey which indicate moderate awareness of LVDs among special educators of Punjab, India which showed a link with utilisation of LVD's among Blind Schools of Punjab [22].

5. CONCLUSION

The present study concludes that the underuse of low vision devices among blind school students in Punjab due to barriers such as cost, awareness, education and stigma. Although LVDs can improve visual performance and academic performance, current implementation is limited.

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