Original Article

Assessment of Barriers to the Utilization and Acceptance of Low Vision Devices

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ABSTRACT

Purpose: To assess barriers to the utilization and acceptance of Low vision devices (LVDs).

Study Design: Cross sectional study.

Place and Duration of Study: LRBT Hospital, Lahore from February 2022 to June 2022.

Methods: The study included 117 patients who noticed an improvement in the LVDs trial but were still reluctant to use LVDs. Patients with best-corrected visual acuity (BCVA) of < 1/60 or a remaining visual field of less than 5˚around central fixation were not included. Patients with lower cognitive levels or psychiatric impairments were also excluded from participating. Self-structured questionnaire was used. Data on age, gender, occupation, diagnosis, preferred LVDs, patient's impression of visual loss, and the main cause of LVDs rejection were analyzed. The Chi-square test was used to determine association. A value of ($P < 0.05$) was considered significant.

Results: The highest non-acceptance rate (45.2%) was seen in patients > 60 years of age. Leading causes for non-acceptance of LVDs were social stigma in patients aged < 40 years (29.7%), fear of losing a job in patients aged 41-60 years (26.1%), and low necessity in patients aged > 60 years (30%).The rate of non-acceptance was highest for retinitis pigmentosa (71.4%) and lowest for diabetic retinopathy (12.5%). Handheld magnifiers had the lowest non-acceptance rate of all the devices (45%).Non-acceptance rates were higher for telescopes and non-optical devices (77.8% and 73.3% respectively).

Conclusion: The reasons for limited LVDs utilization go beyond affordability or availability. Understanding these barriers can facilitate in devising content for the patient, healthcare professionals, and general public awareness campaigns.

Key Words: Low Vision, Low Vision Devices, Handheld magnifiers.

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INTRODUCTION

An individual with low vision has visual impairment despite the usual refractive correction and has a visual field of < 10 degrees from the point of fixation or visual acuity of < 6/18 to light perception but uses or may be able to use vision for task planning.[1] This numerical discern does not account for the real difficulties that low-vision patients have in doing daily duties. In consequence, visual impairment with practically limiting features such as vision loss affects academic, occupational, or societal activities.[2]

Low vision has a massive international influence, impacting 2.2 billion individuals globally.[3] Almost every patient with impaired vision has difficulty performing vision-related routine work, which can lead to a worse quality of life and significant societal implications. Adults above 80 years represent 70% of those with significant vision impairment (Visual Acuity of 20/200 or less in the good eye).[4]

Age related macular degeneration (ARMD) and adult-onset Foveo-macular vitelli form dystrophy (AOFVD) are the main causes of bad vision.[5] Age-related macular degeneration is a progressive, ongoing condition that causes significant vision impairment, interfering with many daily life obligations in affected patients.[6] AOFVD is a type of macular degeneration that is defined as a heterogeneous set of ailments that set off chronic crucial scotoma and foveal disturbance, necessitating sufferers to use self-commutable approach to regulate for each day obligations including reading.[7] Glaucoma, on the other hand, causes peripheral vision loss in its advanced stages, leading to a sight loss of 20 degrees or less.[8] Diabetes is the main cause of poor vision in diabetic patients with uncontrolled blood sugar levels.[9] The most common inherited cause of poor vision is retinitis pigmentosa, a severe condition that starts as night blindness and progresses to subsequent peripheral vision loss.[10] Low-vision rehabilitation (LVR) is a good option for patients with vision loss caused by these disorders, particularly when medical or surgical therapies are either prohibited or ineffective.[11,12]

LVR services can be offered by qualified ophthalmologists, optometrists, or low-vision therapists. To improve patients' vision and achieve vision-related goals, these services involve a personalized, doctor-patient approach. Depending on their needs and level of enjoyment, patients can choose from a variety of therapy modalities. Low vision aids include various traditional and electronic methods (such as sun protection, reading aids, and color vision boosters), and surgical options (such as retinal prostheses).[13] These training and rehabilitation techniques can help patients drive, become more mobile, identify faces, write and read more clearly, see colors more clearly, and feel less anxious. An earlier study found that participants were unaware of the benefits and services provided by low-vision rehabilitation centers.[14]

Low-vision aids come in a variety of forms, but they can be divided into two groups based on how they work: those that convert visual information into alternative sensory information, such as sound or touch (sensory substitution); and those that transmit visual information to make it clearer to the user, as by magnification. Text readers and barcode scanners are examples of aids that convert into sound, whereas vibrating gadgets like the white cane are examples of aids that communicate into touch. Obviously, those without light perception would have no other option but to use it.[15]

Local data is limited regarding use of LVDs and barriers to their use. This study investigated the barriers that patients report in using LVDs, which may allow them to function more efficaciously in their daily lives.

METHODS

A cross-sectional study was conducted from February 2022 to June 2022 at LRBT Hospital, Lahore. The study included 284 low-vision patients who were recommended LVDs. While the study focuses on 117 out of 284 patients who noticed an improvement in the LVDs trial (An improvement of 3 log MAR line) but were still reluctant to use LVDs because of various reasons. The sample size was calculated by RAO Soft Calculator. The data was gathered by using a non-purposive convenient sampling technique. Patients with BCVA of < 1/60 or a remaining visual field of less than 5˚around central fixation were not included in the study. Patients with lower cognitive levels or psychiatric impairments (specified as a score of less than or equal to 5 on the mini-mental scale evaluation) were also excluded from study. There were no age restrictions. For data collection, a self-structured peer-reviewed questionnaire was used. Data on age, gender, occupation, diagnosis, preferred LVDs, patient's impression of visual loss, and the main cause of LVDs rejection were analyzed. All patients were informed about the study's objectives at the beginning of the survey and informed consent was taken from each individual.

The gathered data were then entered into statistical software i.e., SPSS (version 24). According to the nature of the variables, appropriate descriptive statistics were applied. For the data obtained, cross tables were created. The Chi-square test was used to determine association. A value of ($P < 0.05$) was considered significant.

RESULTS

The current study included 284 patients who observed improvement in their visual functions. There were 153 (53.87%) male and 131 (46.12%) female respondents. Regarding the component of age, 101 (35.56%) were < 15 years of age, 88 (30.98%) were from 16 – 40 years, 53 (18.66%) were between the ages of 41-60

years and 42 (14.78%) were > 60 years of age. The response rate was 100% (284 out of 284). Out of 284 patients, 117 were reluctant to use LVDs. Demographic characteristics are depicted in Table 1.

The results show that the non-acceptance rate of Low-Vision Devices was lowest for individuals aged < 15 Years (37.6%). Conversely, the patients aged > 60 years had the highest rate of non-acceptance (54.7%). Females accepted LVDs more readily than males (72.5%). Non-acceptance was more common among males (52.9%). The acceptance/non-acceptance rate was found to be statistically insignificant between males and females. The most prevalent causes of low vision in the current study were retinitis pigmentosa, diabetic retinopathy, and ARMD. The lowest non-acceptance rates were observed for retinal conditions affecting central vision, such as ARMD (32%) and diabetic retinopathy (12.5%), and the highest for conditions that impact the visual fields, such as retinitis pigmentosa (71.4%), glaucoma (33.3%), optic atrophy (54.5%), and hypermetropia/myopia (48.9%). The non-acceptance rate was found to be highest among patients working in offices (89.4%) while it was lowest among farmers (12.5%).

Table 2 shows the reasons for not accepting LVDs in different age groups. Social stigma (29.7%) was the main cause of LVD non-acceptance in patients under the age of 40. Afraid of losing a job (26.1%) and usage difficulty (17.4%) were the most prevalent causes in patients aged 41 to 60 respectively. In patients over 60, the leading causes were low necessity and acceptance of low vision as a normal part of the aging process. Low affordability was cited by 12% of patients as the leading cause of non-acceptance. As a result, a significant relationship was found between age groups and the reasons for LVDs rejection ($P < 0.012$).

Telescopes and non-optical aids had the highest non-acceptance rate (77.8% and 73.3% respectively). It was lowest for spectacle magnifiers (45%) and handheld magnifiers (65%), which included aspheric glasses and prismospheres (Table 3). The most preferred low vision device by the patients was hand-held magnifiers (55.5%). The study found no statistically significant difference between various age

Table 1: *Demographic Characteristics and Diagnosis of Patients Evaluated in Study.*

Variables	**Frequency**		
Age	**LVDs Recommended**	**Acceptance n (%)**	**Non-acceptance n (%)**
< 15 Years	101	63 (62.3)	38 (37.6)
16 – 40 Years	88	46 (52.2)	42 (47.7)
41 – 60 Years	53	35 (66)	18 (33.9)
> 60 Years	42	19 (45.2)	23 (54.7)
Total	284	167 (58.8)	117 (41.1)
Gender			
Male	153	72 (47)	81 (52.9)
Female	131	95 (72.5)	36 (27.4)
Distribution According to Occupation			
House Wife	23	10 (43.4)	13 (56.5)
Farmer	32	28 (87.5)	4 (12.5)
Office Work	19	2 (10.5)	17 (89.4)
Unemployed/Not attending school	23	19 (82.6)	4 (17.3)
Retired Personnel	46	11 (23.9)	35 (76)
Business	57	28 (49.1)	29 (50.8)
Student	68	61 (89.7)	7 (10.2)
Laborer	16	8 (50)	8 (50)
Diagnosis			
Glaucoma	15	10 (66.6)	5 (33.3)
Congenital Optic Nerve Disease	10	7 (70)	3 (30)
High Refractive Error	47	24 (51)	23 (48.9)
Retinitis Pigmentosa	56	16 (28.5)	40 (71.4)
Nystagmus	8	5 (62.5)	3 (37.5)
ARMD	75	51 (68)	24 (32)
Albinism	11	9 (81.8)	2 (18.1)
Diabetic Retinopathy	40	35 (87.5)	5 (12.5)
Optic Atrophy/Neuropathies	22	10 (54.4)	12 (54.5)

Table 2: *Reasons for Not Accepting LVDs in Different Age Groups.*

Barriers	< 15 Years (n) %	16-40 Years (n) %	41-60 Years (n) %	>60 Years (n) %	Total (n) %
Low Affordability	(7) 17.5%	(4) 11.8%	(2) 8.7%	(1) 5.0%	(14) 12.0%
Job Fear of Losing	(0) 0.0%	(8) 23.5%	(6) 26.1%	(0) 0.0%	(14) 12.0%
Usage Difficulty	(5) 12.5%	(4) 11.8%	(4) 17.4%	(3) 15.0%	(16) 13.7%
Low Awareness	(7) 17.5%	(3) 8.8%	(0) 0.0%	(1) 5.0%	(11) 9.4%
Social Stigma	(12) 30.0%	(10) 29.4%	(4) 17.4%	(3) 15.0%	(29) 24.8%
Low Necessity	(3) 7.5%	(0) 0.0%	(3) 13.0%	(6) 30.0%	(12) 10.3%
Denial of Magnitude	(4) 10.0%	(3) 8.8%	(3) 13.0%	(4) 20.0%	(14) 12.0%
Transportation (Further Follow-up)	(2) 5.0%	(2) 5.9%	(1) 4.3%	(2) 10.0%	(7) 6.0%
Total	40	34	23	20	117

Table 3: *Age-Wise Comparison of Acceptance & Non-Acceptance of Various LVD's.*

Age Groups	Spectacle Magnifier		Handheld Magnifier		Telescopes		Electronic Devices		Non-Optical Aids	
	Acc *n* (%)	Non-acc *n* (%)	Acc *n* (%)	Non-acc *n* (%)	Acc *n* (%)	Non-acc *n* (%)	Acc *n* (%)	Non-acc *n* (%)	Acc *n* (%)	Non-acc *n* (%)
Less than 15 Years	5 (35.7%)	9 (64.3%)	9 (60.0%)	6 (40.0%)	1 (25.0%)	3 (75.0%)	0 (0.0%)	1 (100.0%)	2 (33.3%)	4 (66.7%)
16-40 Years	4 (36.4%)	7 (63.6%)	5 (35.7%)	9 (64.3%)	1 (33.3%)	2 (66.7%)	1 (50.0%)	1 (50.0%)	1 (25.0%)	3 (75.0%)
41-60 Years	5 (50.0%)	5 (50.0%)	4 (66.7%)	2 (33.3%)	0 (0.0%)	1 (100.0%)	1 (50.0%)	1 (50.0%)	1 (33.3%)	2 (66.7%)
>60 Years	0 (0.0%)	5 (100.0%)	4 (80.0%)	1 (20.0%)	0 (0.0%)	1 (100.0%)	0 (0.0%)	1 (100.0%)	0 (0.0%)	2 (100.0%)
Overall Acceptance & Non-Acceptance Rate *n* (%)	14 (35.0%)	26 (65.0%)	22 (55.0%)	18 (45.0%)	2 (22.2%)	7 (77.8%)	2 (33.3%)	4 (66.7%)	4 (26.7%)	11 (73.3%)

groups and acceptance/non-acceptance of low vision devices as $P > 0.05$.

DISCUSSION

LVDs are crucial in vision rehabilitation. Using assistive technology to its full potential is a feasible and viable method of bringing down the dependence of low vision patients. The causes of limited use of these devices must be investigated, if vision rehabilitation programs are to be successful. Previous research has found a lack of awareness about low vision rehabilitation among eye care practitioners.[16,17] Only a few studies have looked into the perspectives of patients. In current study, we tried to address the barriers to using LVDs, as reported by low vision patients.

Diabetic retinopathy, ARMD, and retinitis pigmentosa were the main causes of impaired vision in our study population. These results are contrary to a previous study done in 2014 by Khimani KS et al in which the major cause of low vision was discovered to be uncorrected refractive errors.[18] Uncorrected refractive errors are much less common in urban areas as a result of comprehensive screening camps and outreach activities.[3]

Patients with high hyperopia/myopia and retinitis pigmentosa had the highest non-acceptance rate. This result was not unexpected as 80 – 90% of LVD users use their devices for near reading tasks. While myopic individuals take their glasses off to read at a closer working distance, retinitis pigmentosa patients maintain good central vision throughout the course of the disease. Macular diseases that impair central vision had a lower non-acceptance rate (32%) than disorders that affect the visual fields, such as glaucoma (33.3%), retinitis pigmentosa (71.4%), and optic atrophy (54.5%).

Pollard et al. showed the perception of public regarding rehabilitation in their study. The primary issues were found to be resolving transportation difficulties, a lack of knowledge and inadequate interaction with eye-care specialists.[19] Transportation and accessibility were identified as the two main barriers in another study.[20] Since our LVA clinic is housed on the same hospital as the referral specialties, it is interesting that distance was not identified as a significant barrier in the current study. Similar findings were observed by Overbury O et al.[21] Because we were able to include patients who were referred from primary and secondary facilities but were unable to make it to the tertiary care hospital, distance as a barrier could not be completely ruled out even though there is adequate connectivity by public transportation in our region at a very low cost.

Only 12% of our patients reported a lack of

affordability as the main barrier to acceptance. This is probably due to the fact that cost of any recommended device was partially compensated by financial support from the hospital. It is shocking that our study population's non-acceptance percentage remained at 54.9% despite receiving financial aid. It is important to note that even with the subsidy, the relative cost of some LVDs—particularly electronic devices like CCTV was still out of reach for majority of our patients.

Stigma is a strong phenomenon that affects its victims in profound ways. Weak physical health, poor mental health, poor socio-economic status, and academic underperformance have all been associated to stigma.[16] In this particular study, social stigma was the major cause of non-acceptance in 40-year-old patients.

Non-acceptance was 70% among patients over the age of 60. Since they spend most of their time indoors or are dependent on caretakers, the majority of patients over 60 claimed that they did not see a need for these devices. Some patients who did benefit from magnifiers continued to be hesitant because they thought using the device would be time consuming and inconvenient. People above the age of 60 frequently denied the seriousness of their condition. Many patients over the age of 60 accepted impaired vision as a natural aspect of ageing and believed it was not necessary to take further measures to compensate for it.

Even with complete awareness of the solutions and excellent referral settings, only 56% of patients started the rehab process, according to a cross-sectional survey conducted in 2011.[21] The study came to the conclusion that psychological or psychosocial characteristics may also be vital in a person's decision-making process.

Strength of our study is that this study investigates the barriers in our population from the patients' perspectives. Understanding these barriers can facilitate formulation of content for patient, healthcare professional, and general public awareness campaigns. Limitation of the study is that it is a single center research of cross sectional data. More research on the psychological and psychosocial factors that contribute to this process is required.

CONCLUSION

Social stigma and misconceptions about low vision were leading barriers to visual aid acceptance. Contrary to existing assumptions, accessibility and lack of resources are not the chief barriers. Understanding the underlying reasons for decreased utilization can assist in reducing the visual impairment related dependency.

Conflict of Interest: Authors declared no conflict of interest.

Ethical Approval

The study was approved by the Institutional review board/Ethical review board **(SU/AHS/RRC/09-2022-026).**

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Authors' Designation and Contribution

Wardaah Afzaal; Optometrist: *Concepts, Design, Data analysis, Statistical analysis.*

Irum Riaz; Optometrist: *Literature search, Data acquisition.*

Ubaidullah Jan; Optometrist: *Manuscript preparation, Manuscript Review.*

Shahid Noor; Optometrist: *Statistical analysis, Manuscript editing.*

Ahmed Sohail; Optometrist: *Data analysis, Manuscript preparation.*