References


PUBLISHED WORK
IMPACT OF HOSPITAL-BASED LOW-VISION SERVICES ON
THE QUALITY OF LIFE OF VISUALLY IMPAIRED PATIENTS IN
CHANDIGARH

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ABSTRACT

To evaluate the impact of hospital based low-vision services on the quality of life of the visually impaired patients in Chandigarh (India). This prospective study was carried out to assess the impact of hospital based low vision services on the quality of life of 50 consecutive visual impaired people presented at the low vision clinic of Government Medical College and Hospital, Sector 32, Chandigarh from April, 2013 to March, 2014. These patients on the basis of set inclusion and exclusion criteria were subjected to NEI (National Eye Institute) VFO-25 (Visual Function Questionnaire) at the time of presentation and one month after providing the low vision services, such as Optical / Non-Optical LVDs (low vision devices), counselling and rehabilitation. The data was compared through paired student 't' test (on the basis of the composite and sub-scale scores) by Microsoft Excel 2007 Total 50 enrolled patients, males (n=27, 54%) and females (n=23, 46%). The mean age of patients was 48.8 ± 23.5 years. Data of 49 out of 50 patients was analysed and the mean composite score of 63.2 ± 15.1 increased by 7.64 ± 4.1 resulting to one month post low vision services score of 70.8 ± 14.8 (p<0.001). Nine out of twelve sub-scales scores showed statistically significant increase after one month of providing low vision services. The preferred and cost effective distance LVD was monocular hand held Galilean telescope 3X and near LVD was stand magnifier 6X. Although the people of Chandigarh have a high quality of life owing to highest per capita income and ease of accessibility to all the basic facilities still visually impaired patients in Chandigarh were found to having poor quality of life possibly due to lack of awareness or availability of low vision services to the general population.

Key words: Low Vision, Quality of life, Visually impaired patients, Low vision devices, NEI VFO-25.

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The problem of low vision is generally recognised to be significant and it worsens rapidly, particularly with the advancing years. Visual impairment (VI) categories of 1 (moderate) and 2 (severe) in the World Health Organisation's Tenth Revision of the International statistical classification of Diseases and Related Health Problems (ICD-10) comprise the low vision. Actually, the term "visual impairment" includes moderate and severe visual impairment as well as blindness. "Blindness" is defined as a presenting visual acuity of worse than 3/60 or a corresponding visual field loss to less than 10° in the better eye. "Severe visual impairment" is defined as a presenting visual acuity of worse than 6/60 and equal to or better than 3/60. "Moderate visual impairment" is defined as a presenting visual acuity in the range from worse than 6/18 to 6/60.

As per WHO, there are currently an estimated 285 million people worldwide living with low vision and blindness. Of these, 39 million are blind and 246 million have moderate or severe visual impairment i.e. low vision. Majority of these blinds live in developing countries and fortunately 80 per cent of blindness is avoidable, since it is due to causes which are either treatable or preventable. 62 million of the visually impaired people live in India. Out of these, 8 million are blind and rest 54 million comes under the low vision category. These figures of various surveys do not provide the exact estimate of the low vision prevalence as definition used in these survey was not the latest working definition of the low vision.

Low vision, as limited to patients requiring low vision care, is defined by the WHO (Bangkok) definition: A person with low vision is someone who, after medical, surgical and/or optical intervention, has a corrected visual acuity in the better eye of< 6/18 down to and including light perception or a central visual field of < 20°, but who uses or has the potential to use vision for the planning and/or execution of a task. This is particularly referred to as 'functional low vision'.

Health-Related Quality of Life (HRQol) based questionnaire has always remained a method of assessing the impact of health services on the targeted patients. Similarly, National Eye Institute Visual Function Questionnaire (NEI VFQ-25) was developed and extended to the low vision patient assessment. The NEI VFQ-25 is accepted universally for the measurement of quality of life of patients with eye disorders.
Low-vision services are aimed at patients who have residual vision that can be used and enhanced by specific low vision devices. These services are generally neglected in organised eye care. Most important reason is lack of awareness among the eye care professional groups. The global initiative VISION 2020 says, “The Right to Sight intensively advocates for the increased awareness of the need of low vision services amongst the eye care professionals by including low vision care in the priority area of its mission”. Now, it becomes imperative to obtain reliable data on the magnitude and causes of low vision as per the WHO’s definition of the functional low vision which would be invaluable for planning and programmatic purposes. In addition, there is a need to have an India based impact study data so that the low vision services can be better planned for the targeted low vision people.

There is no published study in order to know the impact of low vision services on the quality of life of visually impaired patients with the use of NEI VFQ-25, so far in India. Only one study has been conducted in India till date is a south Indian study which was to examine the psychometric characteristics of the modified Indian version (modified WHOQoL) and its sub-scales in adults with visual impairment (VI) using Rasch analysis. The study was done only to validate the modified version of WHOQoL as per Indian scenario. The other most relevant studies conducted so far outside India were in Nepal and in United Kingdom to assess the impact on quality of life of visually impaired patients after visual rehabilitation. Hence, there was a need of similar kind of study in India to know the Indian scenario which in turn will help in better planning of low vision services.

Despite having the status of the most planned and organised city of India, the planned and systematic low vision services have not been well executed in Chandigarh so far. So, there was no accurate information about the impact of the existing low vision services in the city. Although there has been an increase in awareness of low-vision rehabilitation among eye-care professionals in India, no concrete steps have been taken to develop low-vision services particularly. Eye-care professionals in the field have called for improvement of vision rehabilitation services in India for many years. Reliable and up-to-date information on low-vision patients in India is required to plan appropriate and effective low-vision services, which is not readily available. In order to obtain this information, a prospective
study of visually impaired people was planned in a tertiary care hospital of Chandigarh in India. This hospital based study was aimed to assess the impact of low vision services on the quality of life of visually impaired people at tertiary care eye department of Government medical College and Hospital, Sector-32, Chandigarh.

**METHODOLOGY**

This prospective study was carried out amongst 50 visual impaired people attending the Low-Vision Clinic in Eye OPD of Government Medical College and Hospital (GMCH), Sector-32, Chandigarh, INDIA, during April 2013 – March 2014. The Low-Vision Clinic at the Eye Department, GMCH, as a tertiary eye care centre, meets the Vision 2020 standard list requirements in providing low vision services.

Patients were identified and referred from various speciality clinics (including Retina and Glaucoma) of the department on the basis of the following inclusion and exclusion criteria and as depicted in the flow-chart were included in the study.

**Inclusion Criteria**

Patients of either sex in the age group of 5-80 years, who had BCVA (Best Corrected Visual Acuity) < 6/18 but > or equal to light perception in the better eye OR Central visual field of < 20° with difficulty in orientation and independent mobility in routine tasks due to inadequate distance and near vision, were included for the study. Conditions including AMD (Age-related Macular Degenerations), DM (Diabetic Maculopathy), macular dystrophies, glaucoma, JMD (Juvenile Macular Degenerations), Optic atrophy, CRVO (Central Retinal Vein Occlusion) and RP (Retinitis Pigmentosa), etc. were also considered.

**Exclusion Criteria**

Patients with corneal opacity, cataract, amblyopia in the age group of < 8 years were not included as samples for this study. Informed written consent was taken on the prescribed proforma from all the patients who were enrolled in this study. The study was approved by institutional ethics committee. Before the assessment for low vision care services, the identification of the visually impaired patients was done as per the below mentioned flow Chart 1.
The interviewer asked the 25 questions developed by the National Eye Institute Visual Function Questionnaire (NEI VFQ-25) to generate patients' response. The NEI VFQ-25 consists of basic 25 questions, which covers 12 visual subscales, out of which 11 sub-scales cover visual function specific measures and the 12th sub-scale is the only general health rating sub-scale. The NEI VFQ-25 12 sub-scales and overall composite scores were calculated using the standard scoring algorithm. Response for all items were converted to a scale of 0-100 scores, higher score indicated better quality of life of that particular patient. The items of a particular subscale were averaged together to get corresponding 11 vision-related sub-scale scores, and the overall composite score on the NEI VFQ-25 was calculated from the average of the all the vision-related sub-scale scores.

The NEI VFQ-25 has been validated as a quality of life assessment questionnaire for visually impaired patients in various published studies and has been found to be a valid and reliable questionnaire for a vast range of patients with a variety of eye conditions for the assessment of QOL.11,12. The initial NEI questionnaire was in English which was translated into
numerous regional languages for the understanding of the patients.\textsuperscript{13,14}

\textbf{Low-Vision Assessment Protocol}

At the initial visit, a detailed history was obtained from each patient, and ocular examination was performed. Ocular examinations included recording of visual acuity (VA); assessment of pupillary reaction; measurement of intraocular pressure (IOP) using Goldmann applanation tonometry; slit-lamp examination; fundus examination after dilatation (with an indirect ophthalmoscope using a 20-diopter lens and with a slit lamp using a 90-diopter lens); colour vision test (Ishihara pseudoisochromatic plates); and visual field screening using the Humphrey Automated Field Analyzer (Swedish Interactive Thresholding Algorithm, SITA Standard 24-2). In addition, a visual evoked potential (VEP) test and electroretinography (ERG) was carried out in accordance with the cause of low-vision wherever indicated.

Distance and near VA of each eye was recorded with full refractive correction using LogMAR standard distance vision test chart at a distance of 3 metres or its equivalent, and its equivalent near chart at a distance of 40 cm under good room illumination. Each patient was subjected to practice more than two low-vision devices (LVDs) for distance and near-vision, and in accordance with his or her test results and the daily routine that he or she wanted to follow. The LVDs were prescribed that were easiest, cost-effective and most comfortable for the patients to use. Each patient was asked to answer the questionnaire and the data were used for functional assessment. The patients were followed-up in the clinic after one month for the final assessment of the impact of LVDs on the quality of life of the visually impaired patients.

Following NEI-VFQ, response was sought from each visually impaired patient enrolled in the study, before prescribing the LVDs and after 1 month of LVD usage at the time of follow-up. The rationale for low-vision care among the elderly was to improve social interaction, quality of life and self-esteem, and as a result, to reduce considerably the cost or burden of social care for the individual.
Statistical Analysis

Data were analysed by student paired ‘t’ test by Microsoft Excel 2007 to evaluate the difference between the scores based on questionnaires answered before and one month of providing the low vision services. A p-value of <0.05 was considered statistically significant.

FINDINGS

Low-vision patients enrolled in the present study were almost equally distributed demographically: males (n=27, 54%) and females (n=23, 46%). The mean age of patients was 48.8 ± 23.5 years with a range of 7 to 79 years. The majority of the low vision patients (n=14, 28%) were from the age group of 61-75 years while next higher numbers of patients (n=11, 22%) were from the 16-30 years age group and least number of patients (n=4, 8%) were in <16 years age group as per Figure 1. Various causes of low vision amongst patients were found to be as given in Figure 2.

FIGURE 1

AGE-WISE DISTRIBUTION OF THE PATIENTS

![Age-wise distribution (in years)](image-url)
FIGURE 2

VARIOUS CAUSES OF LOW VISION AMONGST THE VISUALLY IMPAIRED PATIENTS

(AMD= Age-related Macular Degeneration; JMD= Juvenile Macular Degeneration; DM= Diabetic Maculopathy; RP= Retinitis Pigmentosa; CNVM= Chorioidal Neo-vascular Membrane)

49 out of 50 enrolled patients came for the follow-up which actually contributed to 98 per cent response rating as only one patient was lost during the follow-up. Table 2 compiles the sub-scale scores pre and post low-vision services. The initial mean composite score 63.2 ± 15.1 increased by 7.64 ± 4.1 to result in mean composite score 70.8 ± 14.8 post one month of providing low vision services. Nine out of twelve sub-scales scores showed a significant increase after one month of low-vision services.

The most common, preferred and effective distance and near LVDs were monocular hand held Galilean telescope 3X and Stand magnifier 6X respectively (Figures 3 and 4). And next in order of preference were TV specs and hand held magnifiers respectively.

FIGURE 3
PRESCRIBED DISTANCE LVDs

FIGURE 4
PRESCRIBED NEAR LVDs
On logMAR (Logarithmic Minimum Angle of Resolution) chart, average 0.585 log units of improvement in distance vision was observed in the better eye of the patients. While in near, four-five lines increase in near visual acuity was found during the clinical examination with the LVOs prescription.

**DISCUSSION**

Low-vision patients of younger age group were crucial due to more years of suffering. The impact of low-vision services was observed which can be extrapolated to understand the patient’s life-long benefits. While the age group of 61-75 years was equally important as most of the retired people were in this age group, and were free from any official commitment. They could only engage themselves in some time-pass activities like watching television, reading newspapers, playing cards, etc. But if they were unable to perform their time-pass activities due to decreased vision, they feel dejected because post-retirement, they were already out of the social circle.

Comparison of the various studies conducted in a developing country like Nepal and developed country like UK has been done in the Table 1. Patients’ mean age in the current study was very close to the mean age of patients in the Nepal study while quite far from the UK (West Glamorgan) based study conducted. Also, the number of patients in the present study sample was quite close to the Nepalese study. The background of both the countries, Nepal and India, is similar and they share almost the same standard of living. So, both studies were directly very much comparable. The current study’s composite mean score was relatively higher than the Nepalese study while the peripheral vision score was quite similar and rest all sub-scale scores apart from driving sub-scale were higher than the corresponding scores. Significantly higher scores were observed because Chandigarh people have better living standards which can be proved with its highest per capita income (US $ 9,345) on PPP (Purchasing Power Parity) basis amongst all the Indian states and union territories. While, comparing with UK study, present study scored better in all scales leaving aside driving sub-scale and composite score due to their non-availability. The reason behind this gross difference was the mean age of the patient was very high in UK study which implied enrolled patients were very old.
and more in number. In all these studies, the main causes of low vision were found to be JMD, glaucoma and AMD, etc.\textsuperscript{8,9}

### TABLE 1

**Comparison of the present study with other studies**

<table>
<thead>
<tr>
<th>Place</th>
<th>A (present study)</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subjects</td>
<td>India</td>
<td>Nepal\textsuperscript{1}</td>
<td>United Kingdom\textsuperscript{1}</td>
</tr>
<tr>
<td></td>
<td>n=50</td>
<td>n=44</td>
<td>n=66</td>
</tr>
<tr>
<td>Mean age</td>
<td>48.8 years</td>
<td>47.7 years</td>
<td>81.3 years</td>
</tr>
<tr>
<td>Cause of low vision</td>
<td>AMD, JMD, Glaucoma</td>
<td>AMD, DR, Refractive</td>
<td>AMD, Glaucoma, RP</td>
</tr>
<tr>
<td></td>
<td>DM, OA, etc.</td>
<td>Retinal cause</td>
<td>DR (blind and partially sighted)</td>
</tr>
<tr>
<td>Questionnaire Subscale and their corresponding Mean Scores</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. General health</td>
<td>62 ± 26.1</td>
<td>36.9 ± 21.9</td>
<td>57.2 ± 24.7</td>
</tr>
<tr>
<td>2. General vision</td>
<td>46.8 ± 22.8</td>
<td>39.1 ± 18.8</td>
<td>27.8 ± 11.9</td>
</tr>
<tr>
<td>3. Ocular pain</td>
<td>91.3 ± 14.4</td>
<td>67.3 ± 20.2</td>
<td>83.9 ± 23.1</td>
</tr>
<tr>
<td>4. Near activities</td>
<td>53.3 ± 22.7</td>
<td>47.4 ± 18.9</td>
<td>17.6 ± 15.3</td>
</tr>
<tr>
<td>5. Distance activities</td>
<td>50.8 ± 22.9</td>
<td>47.3 ± 18.9</td>
<td>23.3 ± 19.5</td>
</tr>
<tr>
<td>6. Social functioning</td>
<td>75.8 ± 22.4</td>
<td>53.7 ± 17.9</td>
<td>45.5 ± 30.7</td>
</tr>
<tr>
<td>7. Mental functioning</td>
<td>57.6 ± 22.9</td>
<td>42.7 ± 20.2</td>
<td>38.1 ± 22.9</td>
</tr>
<tr>
<td>8. Role limitations</td>
<td>42.8 ± 25.4</td>
<td>42.9 ± 26.5</td>
<td>37.5 ± 23.2</td>
</tr>
<tr>
<td>9. Dependency</td>
<td>70.3 ± 24.4</td>
<td>47.4 ± 20.9</td>
<td>37.5 ± 25.7</td>
</tr>
<tr>
<td>10. Driving</td>
<td>22.9 ± 12.3</td>
<td>55.3 ± 20.6</td>
<td>NA</td>
</tr>
<tr>
<td>11. Colour vision</td>
<td>89.5 ± 19.4</td>
<td>77.3 ± 25.2</td>
<td>55.7 ± 35.3</td>
</tr>
<tr>
<td>12. Peripheral vision</td>
<td>63 ± 22.5</td>
<td>63.6 ± 21.9</td>
<td>32.9 ± 26.4</td>
</tr>
<tr>
<td>13. Composite score</td>
<td>63.7 ± 15.4</td>
<td>49.5 ± 14.1</td>
<td>NA</td>
</tr>
</tbody>
</table>

\textsuperscript{*NA= not available; AMD= Age-related Macular Degeneration; JMD= Juvenile Macular Degeneration; DM/R= Diabetic Maculopathy/ Retinopathy; OA= Optic Atrophy; RP= Retinitis Pigmentosa*
Only one patient was lost during the follow-up. Still 98 per cent of successful follow-up was achieved by constant reminders to the patients for timely follow-up against only 52.2 per cent in the Nepalese study. So, the lesser drop-out rate led to the significant follow-up observations.

As per the data in Table 2, the mean of the sub-scale 1 scores were exactly same during pre and post low-vision services which could be due to the reasoning that the low-vision devices have no direct impact on general health. And also a span of 1 month seems to be too small for any significant change in health to occur. The peripheral vision sub-scale mean score also showed no significant change because peripheral vision enhancing LVDs were neither readily available nor very practically useful. Also, these devices were not beneficial for central vision while most of the time, patients were concerned about their proper reading activities. Another insignificant change was observed in the mean score of driving sub-scale as most of the visually impaired patients had quit or lost interest in driving due to poor vision. Also they were probably not in a position to pass the driving proficiency test with the visual gain achieved through prescribed LVDs. As far as telescopes were concerned, these could not contribute to increase in driving skills rather led to decreased visual field. In driving questionnaire, the two-wheeler driving was not included but had it been included, it could have resulted in an increase in driving sub-scale score. Most of the patients reported in their questionnaires that they have never driven any car (key factor due to non-availability and non-affordability). Maximum change in the various sub-scale scores after 1 month of prescribing low vision devices was found in mental functioning (16.8 ± 9.1) and thereafter in near activities (14.2 ± 10.5) and followed by role limitations (11.5 ± 10.7). Increased level of self-confidence, independency and mental balance were observed due to the increase in efficiency of the near activities like reading newspaper and documents etc. While driving, peripheral vision and general health sub-scales score had no significant change. So, it opened a future scope or dimension of research particularly to address these sub-scales.
### TABLE 2
STATISTICAL SUMMARY DEPictING the VARIATIONS IN NEI VFQ-25 SCores BEFORE AND 1 MONTH AFTER THE LOW-VISION SERVICES LVS (N=49)

<table>
<thead>
<tr>
<th>Questionnaire Subscale</th>
<th>Pre LVS</th>
<th>Post LVS</th>
<th>Change in Score</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 General health</td>
<td>61.7 ± 28.3</td>
<td>61.7 ± 28.3</td>
<td>0 ± 0</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>2 General vision</td>
<td>46.5 ± 23.9</td>
<td>57.4 ± 23.9</td>
<td>10.9 ± 12.8</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>3 Ocular pain</td>
<td>91.1 ± 14.5</td>
<td>93.6 ± 12.4</td>
<td>2.55 ± 6.7</td>
<td>0.01</td>
</tr>
<tr>
<td>4 Near activities</td>
<td>52.5 ± 22.3</td>
<td>65.3 ± 23.8</td>
<td>14.2 ± 10.5</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>5 Distance activities</td>
<td>50 ± 22.4</td>
<td>54.7 ± 22.7</td>
<td>4.69 ± 6.2</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>6 Social functioning</td>
<td>76.3 ± 22.4</td>
<td>76.8 ± 22.2</td>
<td>1.53 ± 4.1</td>
<td>0.013</td>
</tr>
<tr>
<td>7 Mental functioning</td>
<td>77.7 ± 22.7</td>
<td>74.4 ± 18.4</td>
<td>16.8 ± 9.1</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>8 Role limitations</td>
<td>42.1 ± 25.2</td>
<td>52.1 ± 20</td>
<td>11.5 ± 10.7</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>9 Dependency</td>
<td>69.7 ± 24.3</td>
<td>79.6 ± 22.7</td>
<td>10.5 ± 11</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>10 Driving</td>
<td>22.9 ± 12.3</td>
<td>22.9 ± 12.3</td>
<td>0 ± 0</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>11 Colour vision</td>
<td>89.3 ± 19.6</td>
<td>91.3 ± 17.2</td>
<td>2.04 ± 6.8</td>
<td>0.044</td>
</tr>
<tr>
<td>12 Peripheral vision</td>
<td>62.8 ± 22.7</td>
<td>64.3 ± 22</td>
<td>1.02 ± 4.9</td>
<td>0.087</td>
</tr>
<tr>
<td>13 Composite score</td>
<td>63.2 ± 15.1</td>
<td>70.8 ± 14.8</td>
<td>7.64 ± 4.1</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

*Note: p-value <0.05 was considered statistically significant (represented by bold and italicized number).*

In the Nepalese study, the 'refractive correction only' was also included as a LVD which actually could not be regarded as a LVD. So, our results have a negative bearing due to its non-inclusion. Preferred conventional Low-Vision Device for near was Stand Magnifier 6X probably due to its high magnification while for distance Monocular handheld Galilean Telescope 3X due to its cost effectiveness and suitability to the patient.

One of the limitations of the study was small sample size. The other may be that the follow-up interview based questionnaire was asked a month later of getting low-vision service/device which may be assumed as a very short span for following the instructions and getting used to the low-vision device.

### CONCLUSION AND RECOMMENDATIONS

The results of the study are very much contrary to the null hypothesis that there will be no change. The significant positive change was observed in
nine out of twelve sub-scales and also in the composite scores after the introduction of low vision services during post one month follow-up. Due to the dynamic nature of quality of life, their relationships are expected to change over the time as people adapt to their newly acquired low vision devices in variable span of time. The longer-term data from the prospective cohort study should provide more reliable indicators of successful device adaptation in the same region which can be compared with the results of this study. Although the people of Chandigarh have a very high quality of life due to highest per capita income and ease of accessibility of all the basic and sophisticated health facilities. It was found that low vision patients in Chandigarh lacked the good quality of life only due to their unawareness about the existing low vision services available. The study finally concluded that there is an urgent need of organised low vision services with proper publicity in order to make a significant improvement in the quality of life of all the deserved visually impaired patients in India.

The study is a first of its kind done in Chandigarh. The findings of this study is going to be of great help and interest to the people particularly researchers on low-vision and practitioners and policy makers in understanding the effectiveness of the low-vision services.

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