CLINICAL STUDY OF PATIENTS PRESENTING TO LOW VISION CLINIC IN A TERTIARY EYE CARE HOSPITAL

DISSERTATION SUBMITTED FOR

MS (Branch III) Ophthalmology

THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY

CHENNAI

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CERTIFICATE

This is to certify that the thesis entitled **"CLINICAL STUDY OF PATIENTS PRESENTING TO LOW VISION CLINIC IN A TERTIARY EYE CARE HOSPITAL"** is the original work of **DR. RAGHURAMAN. B** and was conducted under our direct supervision and guidance at Aravind Eye Hospitals and Postgraduate Institute of Ophthalmology, Madurai during her residency period from May 2012 to April 2015.

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DECLARATION

I **DR.RAGHURAMAN. B** SOLEMNLY DECLARE THAT THE DISSERTATION TITLED **"CLINICAL STUDY OF PATIENTS PRESENTING TO LOW VISION CLINIC IN A TERTIARY EYE CARE HOSPITAL""** HAS BEEN PREPARED BY ME. I ALSO DECLARE THAT THIS BONAFIDE WORK OR A PART OF THIS WORK WAS NOT SUBMITTED BY ME OR ANY OTHER FOR ANY AWARD, DEGREE, DIPLOMA TO ANY OTHER UNIVERSITY BOARD EITHER IN INDIA OR ABROAD.

THIS DISSERTATION IS SUBMITTED TO THE **TAMIL NADU DR.M.G.R MEDICAL UNIVERSITY**, CHENNAI IN PARTIAL FULFILLMENT OF THE RULES AND REGULATION FOR THE AWARD OF **M.S. OPHTHALMOLOGY (BRANCH III)** TO BE HELD IN APRIL 2015.

PLACE : MADURAI

DATE :

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PART I

PART –II

DEFINITION

WHO working definition of LOW VISION :

It is defined as " 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 in the better eye or a visual field of less than 10* from the point of fixation , but who uses , or is potentially able to use , vision for the planning and / or execution of a task " [1].

WHO – ICD 9 definition of LOW VISION :

Best corrected visual acuity of 6/18 or worse in the better eye or visual field of less than 10* from the point of fixation (20* across) [2].

VISUAL IMPAIRMENT :

Functional loss that results from a visual disorder[3].

VISUAL DISABILITY :

Vision related changes or difficulties in the skills and abilities of an individual. It describes the level of performance of the person base on functional vision [3].

VISUAL HANDICAP :

Psychosocial and economic consequences of visual loss , such as loss of independence or inability to work [4].

ECONOMIC BLINDNESS :

Visual performance with distance visual acuity of 6/60 or less in the better eye with best ophthalmic correction or as a defect in visual field so that the widest diameter of vision subtends an angle no greater than 20 degrees [25].

FUNCTIONAL VISION IMPAIRMENT :

Significant limitation of visual capability , that is manifested by insufficient visual resolution , inadequate field of vision , reduced

contrast sensitivity . Functional impairment prevents or causes difficulty in performing tasks or daily activities [25].

CATEGORIES OF VISUAL IMPAIRMENT

CATEGORY	BCVA	WHO STANDARD DEFINITION	WHO WORKING DEFINITION	INDIAN DEFINITION
0	6/6 – 6/18	Normal	Normal	Normal
1	6/18 – 6/60	Visual impairment	Low vision	Low vision
2	6/60 – 3/60	Severe visual impairment	Low vision	Blind
3	3/60 – 1/60	Blind	Low vision	Blind
4	1/60 – PL +	Blind	Low vision	Blind
5	No PL	Blind	Total blindness	Total blindness

PREVALENCE OF LOW VISION

Low vision is an important public health problem. There are very few Low vision centres available to cater the needs of these people in developing country like India. The purpose of this study is to describe the characteristics of patients presenting to low vision clinic in a Tertiary eye care hospital.

The estimate of world blindness points to some 45 million and an additional 135 million visually disabled (those with low vision) [6] . Nearly 90% of world's blind live in the developing world. There are 9 – 12 million blind in India , amounting to one-fourth of blind people worldwide. It is also observed that nearly 90% of blind people did not have total visual function loss , rather retained some amount of useable residual vision . Hence there is increasing need for comprehensive low – vision rehabilitation services in all developing countries including India.

A population based prospective study was done by ***Dandona et al***[7] in 2002 ,where 10,293 persons of all ages were examined and investigated thoroughly.

144 participants had low vision.

Most frequent causes of low vision were:

Retinal diseases-35.2%

Amblyopia-25.7%

Optic atrophy-14.3%

Glaucoma-11.4%

Corneal diseases-8.6%

The prevalance of low vision was significantly higher with increasing age and decreasing economic status. Extrapolating the data to Indian population of the yr 2000,10.6 million people would have low vision. The data shows that there is a significant burden of low vision in India, suggesting the need for increased low vision services.

VISION 2020 : The Right to Sight [26]:

Vision 2020 is a global initiative launched by the World Health Organisation and task force of International Non-governmental Organisations to combat the gigantic problems of blindness around the world.

Globally five conditions have been identified as achieving the goals of vision 2020 , they are :

1. Cataract
2. Trachoma
3. Onchocerciasis
4. Childhood blindness
5. Refractive errors and low vision.

OCULAR CONDITIONS CAUSING LOW VISION

The main causes of blindness and low vision globally as reported by WHO (Resnikoff et al. 2004) are cataract (47.8%), glaucoma (12.3%) and age-related macular degeneration (AMD) (8.7%). These diseases affect millions of people globally. Cataract affects 18 million people in the world followed by glaucoma which affects 4.5 million people.

As reported by Maberley et al. (Maberley et al. 2005) the main causes of blindness and low vision in Canada are cataract (29.9%), AMD (13%) followed by visual pathway disorders (12%) and other retinal diseases (12%). According to the CNIB (Buhrmann 2007), the most common cause of low vision is age-related macular degeneration (AMD), followed by glaucoma and cataract.

Rahi et al. estimated the causes of blindness and low vision in children in the UK (Rahi& Cable 2003). The leading cause of blindness and low vision was retinal disorders (60.8%) particularly retinal dystrophies and albinism followed by disorders of the optic nerve (16.7%) particularly optic atrophy. Glaucoma accounted for 9.6% of the causes of blindness and low vision in the UK children. In another study on the causes of visual impairment in children in the UK, Rogers (Rogers 1996) reported that the major cause of visual impairment was albinism (22%),

followed by hereditary retinopathy (19%) and congenital idiopathic nystagmus (16%). Cataract (13.8%), optic atrophy (13%), albinism (13%), congenital malformations (12.2%), glaucoma and retinitis pigmentosa (8.1%) were the major causes of visual impairment at a school for the blind in the United States (DeCarlo&Nowakowski 1999). Overall, in the UK and US, the most common causes of visual impairment in children are cataract, albinism, optic atrophy and glaucoma (DeCarlo&Nowakowski 1999, Rogers 1996, Rahi& Cable 2003).

Conditions causing CENTRAL field defect[9] :

- Age related macular degeneration(ARMD)
- Geographic atrophy and other macular ring scotomas(Bull's eye maculopathhy)
- Choroidal neovascularisation and other causes of central scotoma
- Other Macular disorders

  Diabetic macularedema

  Branch retinal vein occlusions

  Macular holes

Conditions causing PERIPHERAL field defect :

- Retinitispigmentosa
- Glaucoma
- Proliferative Diabetic retinopathy
- Stroke
- Optic atrophy
- Tumors involving optic nerve/higher visual pathways

Causes of low vision among neonates and young babies :

- Albinism
- Cerebral cortical blindness
- Congenital cataract
- Congenital glaucoma
- Congenital idiopathic nystagmus
- High refractive error
- Leber's congenital amaurosis
- Retinochoroidalcolobomata
- Optic atrophy or hypoplasia
- Primary hyperplastic vitreous
- Retinoblastoma
- Retinopathy of prematurity

Causes of low vision in childhood :

- Best's disease or vitelliform dystrophy
- Cone dystrophy
- Optic atrophy
- Retinitis pigmentosa
- Stargardt's disease or fundus flavimaculatus
- X-linked retinoschisis.

Causes of low vision in adolescence :

- Best's disease or vitelliform dystrophy
- Cone dystrophy
- Leber's optic neuropathy
- Retinitis pigmentosa
- Stargardt's disease or fundus flavimaculatus.

Causes of low vision in adults :

- Diabetic retinopathy
- Pathological myopia
- Acute optic neuritis
- Trauma
- Posterior uveitis

Causes of low vision in elderly :

- Age related Macular Degeneration
- Cataract
- Glaucoma
- Diabetic retinopathy
- Central retinal vein occlusion
- Central retinal artery occlusion
- Anterior ischaemic optic neuropathy
- Cerebrovascular accidents

EVALUATION OF PATIENT WITH LOW VISION

Refraction techniques in low vision assessment:

1. **Radical Retinoscopy[11]:**

When performing retinoscopy on eyes that have small pupils or opaque media, seeing a reflex at the normal working distance can be difficult or impossible , so decreasing the working distance may allow the retinoscopist to see a reflex that can be neutralized from a new working distance.

2. **Bracketing technique[12] :**

To discriminate changes in blur by adding adequate sphere and cylinder power lens. The amount of spherical lens power needed to elicit an appreciable change.

" *just noticeable difference "lens (JND).*

Vision assessment in low vision

MAR (Minimum Angle of Resolution) :

We can specify vision in terms of the minimum angle of resolution. This is calculated by dividing the letter size specified in the snellen fraction by the test distance. Snellen acuity 20/40 thus corresponds to an MAR of 2 minutes of arc.

Log mar chart:-

A derivative of the MAR , is the logarithm of the Minimum angle of Resolution. Several authors have advocated that acuity charts should contain lines of letters that follow a logarithmic (Geometric) size progression. A snellen's acuity of 20/40 thus corresponds to a logmar of 0.3(=log102).

The Log mar chart uses Sloan optotypes and has been designed to present an equal level of difficulty for each line. It is widely used in low vision care and commonly used in clinical studies.

Different types of Log mar chart :

Lea symbol chart :-

Developed by lea Hs varinen M.D.It is the only complete set of visual acuity test for distance and near vision for all children.

When not correctly recognized the symbol changes into circles and is called “Rings” or “ Ball” by the child. The acuity threshold could be easily assessed by the examiner .The most common and most of the charts are those composed of symbol , Letters or numerals based upon the factors.

Landolt's broken Rings or “ C “ chart :

It is a common test object consisting of a ring . There is break inthe continuity of the rings and the patient is required to identify the position of the break and it does not demand literacy.

'E' chart :-

The E test in which group of 'E's are placed in varying position is administered in a similar manner.

Conversion to snellen'sequivalent

$$\text{Snellen's Acuity} = \frac{\text{Test Distance}}{\text{Letter size Read}}$$

Difference between Logmar and snellen:

Snellen chart	Logmar chart
Herman snellen introduced snellen chart 1862.	Bailey and Love introduced Logmar chart in 1976.
Non geometric progression of letter size.	Geometric progression of letter size.
Variable number of letters per line.	Equal number of letters per line.
Lack of standardized scoring system.	Standardized scoring system.
Relatively large gaps between acuity levels at the lower end of the acuity scale.	The letter changes in size from each line in equal steps of the log of the minimum angle of Resolution (MAR).

Snellen to Log mar	Log mar to snellen denominator
Invert the snellen fraction 20/40 = 40/20	Take anti log or calculation 10 (log mar) $10^{0..3} = 20$
Divided 40/20= 20This is the MAR	That is the MAR Multiply
Take the log (2.0)=0.3	By 20 to get the snellen denominator 2.0 x20 = 40

FUNCTIONAL VISION ASSESSMENT

VISUAL FIELD :

Need for visual fields in low vision patient :

- To document the visual field of the legal blind requirement that is often needed
- to determine.
- To provide objective information about scotoma.
- Patterns of peripheral loss can predict the need to learn safe travel skills and influence in the plan of rehabilitation.

To follow disease progression and explain a change in function, visual field testing is an important diagnostic and screening tool for low vision patient with glaucoma, Retinitis Pigmentosa, and neurological diseases.

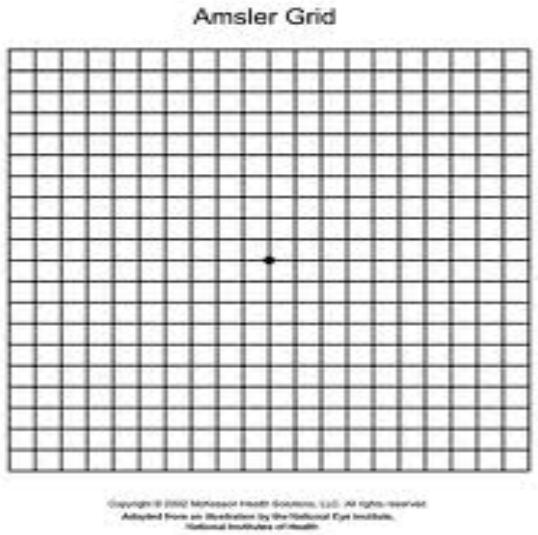
Confrontation:-

This method is easy to identify large scotoma and is useful to find altitudinal hemi field loss rapidly.

AmslerGrid : -

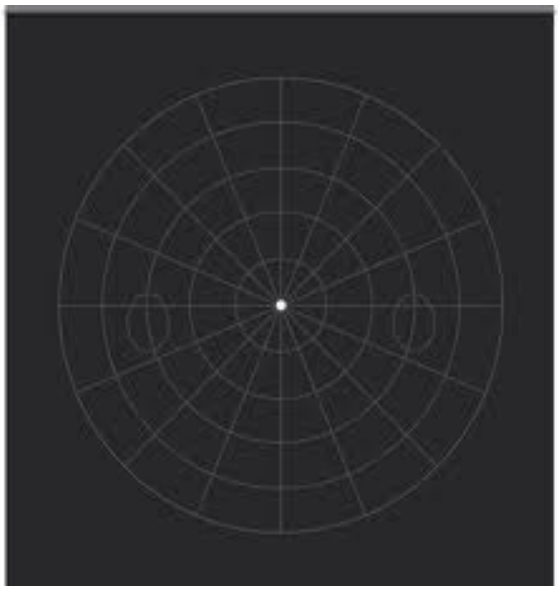
Represents $20^{o}$of the macula at 1/3 of a meter. The grid also has prognostic value, visual acuity may be misleading, if the grid results indicate unfavorable position of scotoma.

A variation on standard Amsler's grid testing is *threshold Amsler's grid testing* . In this test , crossed polarized filters are used in a trial frame to reduce the contrast of a standard Amsler's grid. Relative metamorphopsia or scotomas that would not be obvious to a patient under normal high contrast situations may be elicited under low contrast conditions. The threshold Amsler's grid kit comes with threshold Amsler's grid polarizers , a black plastic Amsler's grid and a white Amsler's grid pad.



Bjerrum'sScreen :-

Central field can be tested by use of Bjerrum's screen. Field of vision is 30^{o} from fovea.



Colour Vision- :

The fransworth Dichotomous test Jumbo version is the most convenient and commonly used test for low vision patient. The pseudo isochromatic plate test do not allow assessment of blue-yellow defect. There are two important reasons for colour vision testing in low vision patient.

1. It relates to aid in the diagnosis of colour vision loss.
2. This colour vision testing will help the low vision specialist in guiding the patient regarding the colour discrimination.

Contrast Sensitivity:-

An ability of visual system to distinguish between an object and its background.Several contrast sensitivity charts are available with different features and advantages -The functional acuity contrast test (FACT), Pelli Robson chart, the Regar chart and Light house contrast sensitivity test system can be used.

Contrast sensitivity testing has several important uses when you are evaluating patient with reduced visual function. Patient with poor contrast sensitivity often benefit from increased illumination when performing near range tasks as reading.

A reduction in Contrast Sensitivity provides information to the practitioner that a patient may benefit from one or more of the following :

- A lighting evaluation
- Environmental modifications to help a patient with activities of daily living.
- Orientation and mobility services.
- Use of CCTV.
- A typoscope to reduce glare and contour interaction (crowding phenomenon)

A common measure of contrast is known as *Weber Contrast*, calculated as the difference between the luminance of an object and its background divided by the brighter of the two. *Contrast threshold* (CT) is defined as an object with the lowest contrast that a patient can recognize.

PelliRobson chart for testing Contrast Sensitivity.

Glare test :

Brightness Acuity Tester (BAT) determines subjectively the impact of glare on visual performance [34,35].

Scanning Laser Ophthalmoscope :

SLO macular perimetry function is important in understanding the central visual function of patients with macular disease.

PSYCHOLOGY OF LOW VISION

The response to loss of vision :

Attitudes to bereavement have been addressed in depth by American psychoanalyst Elizabeth Kubler-Ross. It is generally accepted that the loss of a limb or a faculty, such as vision, is considered as a form of bereavement, with a similar response sequence. The process has been described as having five stages: denial, grief, anger, depression and eventually acceptance. Alternative terminology has been used but the process of moving from a series of negative responses to more positive ones is almost universally accepted.

1. **Denial :**

Denial shows itself in a number of ways. Typically, a patient with macular disease presents requesting ‘better glasses’, often after having been advised that the disorder is irreversible and untreatable. While it is reasonable to assume that a person who has never had a refractive error corrected may not appreciate the difference between a relative scotoma and a poorly focused image, the same cannot be true for most patients with low vision, of whom the vast majority will have had to cope, at the very least, with presbyopia.

2. Grief :

It is not easy to distinguish grief from depression. The patient is agitated, may weep a lot, apparently have a short attention span, talk in general terms about what they used to do, and revert constantly to what has been lost: ‘I used to do such a lot, now I can’t do anything.’

3. Anger :

Anger is often easier to manage, though less easy to recognise. There appears to be a great need to blame someone for the situation; frequently this is a doctor, especially when underlying macular disease impairs outcome following cataract extraction.

4. Depression :

Reactive depression often shows as passivity and dependency. The patient feels that they are totally helpless, worthless and powerless. They may well complain of disrupted sleep patterns. Where the grieving patient is agitated, the depressed one is calmer; they have given up, and either leave most of the talking to their escort or voice negative attitudes:

Recent studies highlight a strong association between visual loss in age-related macular degeneration (AMD) and depression. **Rovner&Casten** found a base rate prevalence of syndromal depression of 23% in newly

diagnosed AMD patients. This compared with 'primary care' and 'community based' rates amongst normally sighted elderly patients of 12% and 3% respectively.

Williams et al highlight the extent of emotional distress associated with recent onset AMD and equate the associated decline in quality of life with that experienced by those diagnosed with obstructive pulmonary disease and cardiovascular disease.

One particularly distressing recent finding concerns the link between visual impairment and suicide in the elderly. **Waern et al**, studying the link between disability and suicide in the elderly, found visual impairment carried an increased odds ratio of 11.4.

5. Acceptance:

Most patients eventually acquire the habit of acceptance. More than the reassurance from the professionals,the evidence of their own eyes is preerable to believe in a patient with macular disease with a recent history

of detoriationwhoch is progressive when told that they would not total blindness.

It is also very helpful when they hear tbe same prognosis from independant people with similar low vision.The patient discovers that he not only has a disablity but also has abilities,he finds stability in his vision &starts seeking ways to enhance his abilities.

When the patient reaches this point,that is the right time to prescribe low vision aids.The professional can feel contended about the fact that there is precipitation of the acceptance process.

FUNCTIONAL IMPACT OF LOW VISION

Low vision has a myriad of impacts on the daily living of individuals affected.

And since its incidence is more with increasing age,it is often associated with other co-morbidities which compounds the problems furthermore.

The most important impacts of low vision on daily living are discussed below:

1. On reading
2. On driving
3. Loss of mobility
4. Loss of Independance
5. Depression
6. On cognitive function

1. On reading:

For recreational,vocational and personal needs reading is an important aspect of daily living which makes a person feel independent.

When the level of vision decreases,so does the speed of reading.

Factors that affect reading ability are

a) Print size
b) Magnification
c) Print contrast
d) Font
e) Luminance level

Legge (Legge et al. 1985a, Legge et al. 1985b) was the first researcher who systematically investigated reading performance for different text parameters and derived plots of reading speed as a function of print size for people with normal and low vision. He described how reading speed reaches a maximum or plateau across large print sizes and shows a cut off when print size is close to the reading threshold. He also defined what he called a critical print size which is the smallest print size, within the reading speed plateau, that allows the reader to read with maximum reading speed. Legge also suggested a method to calculate reading acuity more accurately. Reading performance in people with low vision is now often assessed by four functional measurements: reading speed, reading accuracy, critical print size and reading acuity.

The Minnesota Low-Vision Reading Test (MNREAD charts) was developed by Legge (Legge 2007) to measure reading performance as a

function of print size. The charts consist of sentences in sequentially decreasing print size. The MNREAD sentences consist of 60 characters (ten words) of standard word length (six characters). The print sizes range from -0.5 logMAR to 1.3 logMAR. LogMAR is the logarithm of the minimum angle of resolution.

A more recent study of Lueck et al. (Lueck et al. 2003) showed that children with low vision need at least three times the acuity reserve to read efficiently. This results in much larger print sizes being required for children with very low visual acuities in order for them to gain the optimum acuity reserve. Lueck et al. (Lueck et al. 2003) reviewed some ways that help children with low vision achieve the optimum acuity reserve. These include decreasing the reading distance, increasing the print size material or using a low vision aid.

Generally patients with moderate loss of reading ability are treated with magnifiers and high near-additions.

But few patients with severe loss of reading ability may need

- Stand & hand held magnifiers
- Spectacle mount near telescopes
- Closed circuit televisions
- Non-visual devices like
    - Books on tape

- Optical scanners
- Screen readers

2. On driving:

Loss of driving ability leads to major impact on independenceand quality of life. Visual requirements for driving ability are not clearly understood.

While patients with low visual acuity and field defects have been found to be more prone for accidents,the assessment of VF and VA loss alone do not form the criteria as vision standards for driving licensure.

In developed countries , even when given license, some restrictions are imposed on patients with low vision. These are

- ❖ No night driving
- ❖ Approval to drive only in certain types of road and routes
- ❖ Use of specific driving mirrors
- ❖ Driving with a bi-optic telescope

3. Loss of mobility:

It is found that there is increasingly high risk of

- ❖ falls,
- ❖ hip fractures and
- ❖ poor mobility

in community-dwelling indivuals with low vision.

4. **Loss of independence:**

High rates of admissions in nursing homes have been found even among patient with very minor visual impairment.

Twice the number of visually impaired were admitted in homes compared to those without visual impairment.

5. **Depression:**

There is fairly high rate of depression in patients with low vision especially those due to age-related macular degeneration(~30% incidence)

Association of depressive illness in a patient with visual impairments profoundly exacerbate the visual-related disability.

Depressed patients report greater disability than non-depressed patients.

Depression in patients with low vision is diagnosed by the following criteria:

- Inability to experience pleasure
- Sleep/appetite disturbance
- Trouble in concentration
- Feelings of guilt

6. Loss of Cognitive Function :

Since dementing diseases like Alzheimer's and vascular dementia becomes more prevalent with increasing age , it could be a common co-associated condition with low vision .

Rehabilitation to low vision patients with cognitive impairment becomes difficult due to memory impairment. Hence a friend/family member should usually accompany them.

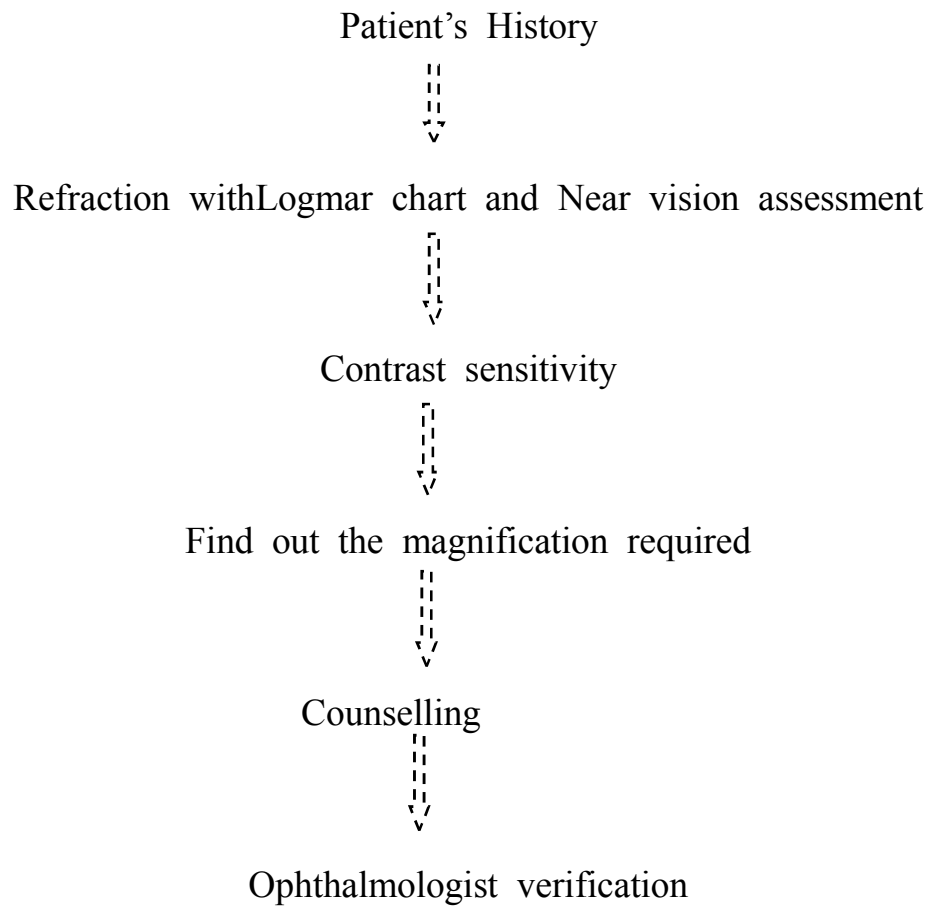
Beliveau and Smith identified the following visual skills as needed for the efficient use of vision and low vision devices:

1. Scanning : moving the head or eyes from one point to another in the environment to gain visual information.
2. Fixation : directing the eye(s) toward , and focussing one's gaze on , the object of regard so that the light rays from the target fall on the best area of vision in the retina.
3. Tracing : scanning and locating a desired line in the environment (such as sign-pole) and then fixating on the line and following its path visually.

4. Spotting (or localisation) : scanning to find a desired target , and then maintaining fixation on the target long enough to identify it.
5. Tracking : following a moving target with the eyes or with the head and eyes , while in a stationary or moving position.
6. Visual closure : guessing or perceiving the total object or picture when only parts of its can be seen.

STEP – WISE ASSESSMENT OF PATIENT WITH LOW VISION

The following steps are involved in performing low vision assessment.



1. Patient's History:

The low vision examination begins with an extensive history. Special emphasis is placed on the functional problems of the patients including chief complaints and any current problem. Care has to be taken to understand how the patient is functioning and what are his needs.

2. Refraction With log mar chart:

The LOG Mar charts are designed for 4 meters direct distance and its letter subtends an angle of 5 minutes of arc at 40 meters. Reading the top row at 4 meters earn a score of 4/40 which is equivalent to 20/200 or 6/60 in snellen's fraction and log value of 1.0.it can be used at 2 meters and 1 meter also. When used at 2 meters, the acuity for the top row has to be recorded as 2/40 and if used at 1 meter, it has to be recorded as 1/40, which can be considered equivalent to 10/200 and 5/200 respectively.

1. **Near vision assessment** :

It could be assessed using any of the charts mentioned below.

- **Jaeger**

Text is formulated fromtype of 20 different sizes, the size progressions of which havenever been standardised. Many of the charts produced accordingto the Jaeger system also used highly variable word and letter spacings.

- **Snellen equivalent system charts**

The scientific basis for the Snellen near system is identical to that of the distance acuity system in that each letter has been constructed such that, when held at a specified distance, it will subtend an angle of 5 minutes of arc at the eye . Most near vision Snellen charts have been

produced as one-seventeenth of the original chart and are designed to be used at 35 cm. The major problem with these charts is that when acuity values are expressed as Snellen equivalents the value holds true only when the chart is used at the specified test distance.

- **N point system charts**
- **Keeler A series charts**

Designed to complement the similarly named distance charts , letter sizes have been calculated such that letters forming A1 text, when held at a working distance of 25 cm, will subtend 5 minutes of arc at the eye. Successive lines increase in size by a factor of ×1.25 or 0.1 Log units. Designed specifically to assist the low vision practitioner with the task of calculating expected magnification requirements, the system was in many ways ahead of its time. The only real disadvantage concerned the layout and spacing of words, which varied considerably from top to bottom.

- **Sloan M series charts**

Specified in M notation and designed to complement Sloan distance charts, the M system was, until recently, used almost universally throughout the USA. The series of five reading cards was designed specifically to assist with the calculation of the anticipated reading addition

required to achieve any given reading task by patients with low vision. The recommended working distance at which to use these charts is 40 cm.

- **Bailey–Lovie word reading charts**

Ranging in size from 1.6 to 0.0 LogMAR (N80 to N2, or M10 to M0.25, equivalents), these charts (26 × 20.6 cm) incorporate 17 lines of unrelated words and are designed for use at 25 and 40 cm. There are two words in each of the larger categories, increasing to six as one moves down the chart towards the 0.0 threshold level. The charts are ideal for measuring reading acuity, but are restricted in their ability to assess reading speed. Print sizes are also specified in N point notation.

- **Pepper visual skills for reading test (VSRT)**

Available in text sizes of N8 to N32 (M1–M4), these charts were designed to test reading speed and fluency in patients with macular disease. The charts consist of 13 lines of text of identical size. The complexity of the reading task increases as one moves down the page, ranging from well spaced single-letter identification at the top to complex unrelated longer words at the bottom. These charts are designed for use in low vision clinics where patients with reduced reading performance are to be given training exercises designed to increase reading speed.

- **MN read charts**

The Minnesota low vision reading test is available in several forms, all of which are available in both conventional and reverse con-trast. The original test was computer based and designed specifically to assess on-screen reading speed using scrolled simple sentences. **Ahn et al**produced Printed versions, which achieved comparable results when used to assess reading speed . The reverse contrast facility is particularly useful when testing patients who find reflected glare from the white page uncomfortable or debilitating.

- **PNAC chart**

The PNAC (practical near acuity chart) represents an attempt to standardise the number and difficulty of words on a LogMAR chart and to allow a quick measurement of near visual acuity. It uses related three-, four- and five-letter words on each line. In a comparison with the Bailey–Lovie near chart, which uses unrelated words, the use of related words was found not to affect the threshold near acuity measured.

3. Contrast sensitivity:

Contrast sensitivity refers to the ability of the visual system to distinguish an object from its background. It refers to the testing

methodology that involves the measurement and analysis of the human visual system's ability to detect variations in the size and contrast of object. It test the functional vision or how well an individual sees everyday visual objects or scenes. contrast sensitivity test is a useful tool in the early detection of various diseases. In low vision examination poor contrast sensitivity suggests that the patient may need double or triple the power of magnification that would have been calculated.

4. Predicting magnification required:

Predicting the magnification required implies that we can select a suitable magnifier more quickly, although the prediction is only a general guide to start the work up for magnification requirement.

a) Distance magnification:

For a distance task, we must try to estimate what acuity would be required to perform a task adequately.

For example, to improve the visual acuity from 6/60 – 6/6

$$\text{Magnification required} = \frac{\text{Target visual acuity}}{\text{Best corrected visual acuity}} = 6/6 \,/\, 60/6 = 60/6 = 10x$$

b)Near magnification:

KestenbaumFormula[28] or Rule - take the Best corrected visual acuity, turn it upside down and divide the fraction. This will give you the initial number of diopters of equivalent power which will hopefully enable the patient to read standard 1M newspaper size print. For example: the patient has 3/60 acuity, thus requiring 20 diopters of initial equivalent power in low vision devices to be able to "read" standard newspaper print. This is to be considered a starting point only and adjustment of power is often required beyond this point.

5. Counselling:

It is a developmental process, in which one individual (the counselor) provides to another individual or group (the client), guidance and encouragement, challenge and inspiration in creatively managing and resolving practical, personal and relationship issues, in achieving goals, and in self-realization.

6. Ophthalmologist's Verification:

The ophthalmologist plays an important role in low vision assessment. After finishing the vision assessment and the counseling, the ophthalmologist will do final recommendation based on the clinical

findings.

- Ocular History
- Medical History
- Refractive History
- Task Related History

Equipment required for Low Vision Clinic :

1. High and low contrast visual acuity charts for distance and near vision.
2. Retinoscope
3. Trial frame (both adult and children)
4. Trial lenses (preferably full diameter)
5. Ishihara test chart for colour vision
6. Amsler grid
7. Titmus fly stereo test for binocular vision
8. Perimetry

LOW VISION DEVICES

Historical review :

The history of low vision devices extends back to the origin of ophthalmic lenses. Since that time , numerous inventions and developments have paved the way for the evolution of modern low vision devices.

During initial times , it was the convex lenses which was primarily used as reading lenses. Later concave lens was developed . The first major contribution to the development of telescopic devices for patient care was made by a Jesuit priest , F. Eschinardi , in 1667. The next major development of the telescopic device was made by H.Dixon in 1785. Steinheil and Seidel designed a small Galilean telescope in 1846 that was composed of an objective lens of crown glass and an ocular of flint glass. To evaluate individuals with amblyopia or myopia , the Ziess Company produced trial kits of telescopic spectacles with slip – over lenses to correct for refractive error and to create appropriate reading distances. After World War I , Zeiss telescopes were used for a large number of wounded soldiers who had reduced vision in both eyes.

In 1934 , Feinbloom designed microscopic spectacles ranging in power from 2X to 20X for those patients who wanted to read but who could not use a telescopic system with reading caps. He also demonstrated the importance of a typoscope , a black reading slit designed by Prentice in 1897 , when reading with high powered lenses. In 1936 , Tait and Neil designed telescopic spectacles . CCTV was first described in 1959 by Potts , Volk and West. In 1983 , Feinbloom designed the Amorphic Lens for patients with reduced peripheral fields. In 1989 , Dr. Spitzberg developed the Behind-the-Lens telescope with cosmesis in mind. In 1995 , image – processing technology became available to low vision patients.

Four different ways of enlarging an image is used in low vision practice. They are

1. Relative distance enlargement :

When an object is brought closer to the eye, the size of the retinal image increases while the field of view decreases. Television viewing is a common example of this. This approach may be impractical for some viewing situations.

2. Relative size enlargement :

When the size of the object is increased, the size of the retinal image also increases proportionately. A common application is the use of larger print in text books or larger computer monitor. This method is not practical for many situations where the objects of interest cannot be enlarged. Hence this method of magnification is seldom used in designing low vision aids.

3. Angular enlargement :

Lenses can be used for performing optical zoom, which allows the object to be moved closer to the eye than normally focused.

4. Projection enlargement :

Refers to increase in object size by an overhead projector onto a screen or a monitor. Examples are projectors and CCTV. The magnification is obtained by comparing the projected image size with the original object size.

Low vision devices are of two types

Optical devices

Non-optical devices

Optical devices :

Low vision device	Type of magnification
Spectacle lenses	Relative distance
Hand held magnifier	Relative distance and Angular
Stand magnifier	Relative distance and Angular
Near telescope	Relative distance and Angular

Electronic devices :

Low vision device	Type of magnification
CCTV	Projection and Relative size
Head mounted video magnification	Projection

OPTICAL DEVICES :

They magnify the object by increasing the visual angle and produce a larger image of the object on the retina by enhancing all the receptors which are functioning.

Hand magnifier:

They are available in a wide range of powers and shapes. It is important to hold it straight. The eye, the magnifier, and the material at which one is looking should all be in one straight line. Tilting the magnifier will distort what one is trying to see. It is sometimes easier to keep the magnifier straight if one places the material being read on a clipboard or stand.

The hand magnifiers are available in 3 basic designs :

- Aspheric
- Aplanatic

ADVANTAGES :

- Eye to lens distance can be varied
- Can maintain normal reading distance
- Most convenient for short term tasks
- Easily available
- Light weight and easy to clean
- Socially acceptable
- Internal illumination possible

DISADVANTAGES :

- Maintaining focus is a problem in some , especially in elderly with tremors and poor manual dexterity
- Limited field of vision
- Plastic lenses require careful handling and cleaning
- Internal illumination increases weight and complexity

Stand magnifier:

Stand magnifier is a convex lens in a rigid mounting that has been set by the page than its focal distance to reduce peripheral aberrations. Therefore, the rays emerging from the stand magnifier are no longer parallel but divergent, requiring accommodation effort or a moderate reading addition to bring the image in to focus. The stand magnifier

automatically sets the magnifier at the correct distance from the reading material. Many patients prefer it because it is relatively easy to use. It may be illuminated or non – illumination.

ADVANTAGES :

- Has a fixed focus , easy for patient to see through
- Works good for patients with tremors , arthritis and constricted fields
- May have their own light source
- Moderately priced

DISADVANTAGES :

- Reduced field of view
- Requires good hand coordination
- Too close to reading posture and so sometimes painful for long hours
- Need a flat stable surface to rest on

Prismosphere:

Binocularity is maintained by incorporating base in prism by these lenses.A prism lens is mounted in a spectacle to move an image to an alternative healthy area of the retina,whencentre portion of the retina is damaged . It is also possible to slightly shift the magnified image . Prism glasses are of great use for those with macular pathology.

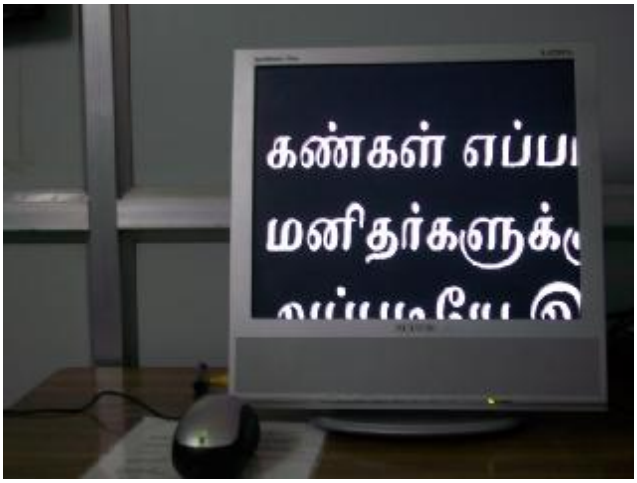
Aspheric Glass:

To read printed matter,2 things are essential in persons suffering from low vision ; which are significant magnification and considerable field of view.Highdiopteric powers, generally ranging from 12º D upto 30º D are essential for this purpose. Spherical surfaces suffer from an inherent optical defect called spherical aberration. Fortunately,upto a lens power of 12º D,this defect almost remains insignificant. The effective field of view

reduces beyond 12º D reduces due to the spherical aberration making the lens useless for all practical purposes as Low vision device. The only method available is aspherical glasses to eliminate spherical abberation.

Closed circuit television:

Zoom television cameras are used by electronic optic devices to magnify materials on television screen,which are called closed circuit television. The standard CCTV consists of three major components : camera , monitor , and moveable reading platform. Most CCTV systems made in 1989 or later use a CCD camera. The advancements of CCD are enhanced image contrast , brightness and clarity of images , less ghosting of letters on the monitor when the text is moved , increased depth of field .



ADVANTAGES :

1. Large range of enlargement
2. Can be used at natural working distance , binocularly and with good posture
3. Minimal peripheral aberrations
4. Reversed polarity(eg.white on black)
5. normal working distances
6. greater magnification amplitude of 3x to 100x

DISADVANTAGES :

Only disadvantage being its quite very expensive

TELESCOPE:

Telescopes are the only aids that improves the resolution of a distant object by enlarging the image using angular magnification. In their simplest construction a telescope contains two optical elements objective lens and the eye piece.

Galilean Telescope:

It is a simple system of a convex objective lens combined with a concave ocular lens that produces a real, upright image when the lens are separated by that difference in their focal lengths. The concave ocular lens always has the higher power. Galilean telescope used for low vision may be focusable or non focusable.

Keplerian Telescope:

In a keplerian telescope both the objective lens and ocular lens are convex lens. An internal system of a prism erects the inverted image. The field of view is usually large and they are available in higher magnification than Galilean telescope.

Hand Held Telescope

The most common type of distance optical device is the hand held telescope**.**

Spectacle mounted Telescope :

Spectacle with a telescoped fitted to the lens. The working distance is increased.

CLIP ON TELESCOPE:

ADVANTAGES :

- Only possible device to date which enhances distance vision
- Can be used in classroom for blackboard reading or outdoors

DISADVANTAGES :

- Restricted field of view
- Usually expensive

Non Optical Devices:

People who suddenly find themselves with low vision are often surprised at how essential good eyesight is not only for reading, but just to get through everyday life. For the visually impaired, something as simple as checking the time on their watch or being able to see the difference between currency can become a difficult task . They are things designed to help in independent living. The devices do not use lenses but rely on Relative size magnification , Postition , Illumination , Contrast , Colour or other sensory inputs for their effects . They change the environmental perception by improving illumination, contrast and spatial

relationships. Main thing is it makes things 'Bigger, Bolder, and Brighter'.

- **FOR DAILY LIVING** :

1. **In the kitchen :**
    - Liquid level indicators
    - Easy to see timers
    - Food slicers
    - Chopping boards and knives
    - Tray liners and holders
    - Talking microwaves and scales
2. **Around the house :**
    - Audible thermometers
    - Speaking signs and digital voice recorders
    - Rain alerts
    - Needle threaders
    - Button guides
    - Tape recorders
    - Big button telephones
    - Watches and clocks

- Garden cane tops

3. **Medical and personal care :**
    - Large syringes
    - Pill organisers
    - Eye drop dispensers
4. **Travelling and mobility :**
    - Reflective bands
    - Tinted glasses
    - Canes
    - Guide dogs

Large Print:

Large print involves the concept of using relative size magnification. If an object is made larger, it will be easier to see. The amount of magnification obtained depends on a comparison of the new larger objects compared with the standard size objects. The advantages of using larger print lies in its easy acceptance by the low vision patient.

Illumination:

Proper illumination is essential for the low vision patient. Light should be adjusted on the printed material and should not shine in the eyes. This light increases contrast or increases the difference between the light coming from the object viewed and the light level of the background of the object.

Typoscope, Notex and Letter Writer:

It allows the line of print to be seen through a slit while it blocks the rest . When a single line print is framed by a black, that line tends to stand out better and sharper, thus increasing the contrast.

Notexcan be designed to help identifying the currency notes.

Letter writer is designed to help the low vision people to write in a straight line.

Reading stand:

The purpose of reading stand is to hold the reading material in a comfortable position so that the patient can maintain a close working distance without straining the neck and back muscles or tiring the arms. Many people add one adjustable lamp to help reading, especially for extended periods. The reading stand may also be used to reduce the object distance to ensure magnification effect.

Writing Guide[31] **:**

1. Correct positioning of the letter writer (black portion of the guide with the cuts facing upwards).
2. Open the letter writer like a book and put the writing paper inside the guide . The corners of the writing paper fall within the four corners of the guide.
3. Feel and find the empty cut out spaces in the letter writer and start writing.
4. Identify the end of each line by feeling the elevated mark on the guide.

Signature guide[31] :

A rectangular black card with a rectangular cut out in the middle of the card.

Reading lamp[31] :

1. Visually impaired persons need more light (illumination) when reading , to improve the contrast of the print.
2. The contrast could be enhanced by bringing the light closer to the material.
3. The direction of the light should be towards the printed material .
4. 60W incandescent and 11W fluorescent bulbs are easily available.

Absorptive Lenses :

Absorptive lenses are used to :

- Enhance contrast
- Reduce glare
- Eliminate UV light

CPF 50 (yellowcolour) – for glaucoma patients

CPF 511 (yellow orange) – for early cataract

CPF 527 (orange) – for macular degeneration

CPF 550 (red) – for retinitis pigmentosa

Talking Products:

Talking watches, talking calculators, talking telephones are a few of common devices that are available with speech output. Often many of these voice output products also have large display incorporating relative size magnification along with voice output.

Tactile products:

The second largest sensory input is used when the visual sensory input is not functional, is the sense of touch. Braille is the most common type of product to provide this sensory input.

Field Utilization Devices[31] :

They are occasionally prescribed for use by patients with Retinitis Pigmentosa.

1. **Fresnel Prisms :**

Ranging from 10 – 30 diopters which could be attached to the outer edge of the spectacles with base towards the peripheral field defects.

2. **Reverse Telescope :**

Useful in patients with good central acuity. Images are minified , hence more information could be projected to the small central functional area of retina. Available as hand held or spectacle mounted.

Low Vision Enhancement Systems (LVES) :

Head mountable units which work on the principle of Optical magnification , where camera fitted with variable zoom lenses are used.

1. The Wilmer / NASA / VA LVES
2. LVIS – Visionics Corporation
3. Enhanced Vision Systems V-MAX
4. Jordy

DISADVANTAGES :

1. Physically large and heavy , and so not suitable for prolonged use.
2. Run by battery units , which has to be carried with the head mount.
3. Limited field of display.

SELECTION OF DEVICES :

Following are the considerations to be dealt with before prescribing the device

- Age of onset of the disease
- Diagnosis and progression of the disease

- Type of field defect
- Educational and Occupational demands
- Motivation and Psychological factors
- Cost of the device
- Optical considerations of selecting the device

Practicalities of usage of low vision aids by children :

1. Phakic children with an acuity greater than 6/60 [LogMAR1.0] generally prefer to utilise reduced working distances and increase accommodation to tackle short- to medium-term near vision tasks. As demands increase and accommodation lags, low visual aids have to be used more routinely. Dome magnifiers are often the aid of choice for albinos and those with congenital nystagmus.
2. Aphakic children require higher levels of magnification and benefit from stand magnification (×3 to ×12) or spectacle magnifiers (single vision or bifocal). Low vision aids must be used in conjunction with a spectacle or contact lens distance correction.
3. Children with retinitis pigmentosa and central visual loss benefit from closed circuit televisions (CCTVs) and, as they get older, special software that they can utilise with a personal computer thus gaining access to on-screen enlargement and speech conversion.

4. Distance low vision aids can be used by virtually all school aged visually impaired children, although there is sometimes resistance to use these in the public domain. The children should be encouraged to enjoy the device and consider it as a leisure appliance as well as an educational device.

It is important to remember that the older child or young adult who is diagnosed as having a serious visual problem may have the added psychological adjustment of adopting a modified lifestyle and career choice. Career plans may have to be altered, the patient may come suddenly to the understanding that driving will now not be an option during adulthood , and sometimes the driving licence must be surrendered having often just been acquired. This is tragic for those who are already in employment.

LOW VISION REHABILITATION

Vision rehabilitation is defined as the process of treatment and educatin that helps individuals who are visually disabled attain maximum function , a sense of well being , a personally satisfying level of independence , and optimum quality of life. Function is maximized by evaluation , diagnosis , and treatment including , but not limited to , the prescription of optical , non optical , electronic and or other assistive treatment options. The rehabilitation process includes the development of an individual plan of care specifying clinical therapy and / or training in compensatory approaches. Rehabilitation for visual impairment is no longer an ancillary to ophthalmology,but integral to its larger mission to preserve sight,and it can be as simple as providing essential information.1One recent study suggested that visual impairment occurring in middle age, rather than in later life, is more disruptive and associated with a greater risk of negative consequences for the individual.

Visual rehabilitation is now a critical component of the ophthalmic standard of care and ophthalmologists are the referring physicians and providers of basic information on living with vision loss.

In institution based rehabilitation, the people gets services at the institution or Hospital. Thus instead of concentrating only on medical

management or intervention , the Ophthalmologist should look into and guide in situations when the disease is beyond treatment .

The following Rehabilitation services are offered at Institution Based Rehabilitation,

1. **Children rehabilitation:**

Low vision examination:

A low vision services focus on enhancing the remaining vision by prescribing special glasses and low vision devices.It is also called as functional vision assesment,which concentrates on evaluation of vision functioning & the effect on day to day activities such as cooking & reading newspaper.

A low vision specialist performs a detailed visual analysis after an interview which helps to determine the person's visual goals.

Telescope aids are used to evaluate distance vision.Near vision skills like reading are evaluated by high powered spectacles,hand/stand magnifiers. Lighting levels are evaluated by special eye charts.

It takes about half an hour to instruct the patient regarding proper use of these devices & it is repeated before the counsellor prescribes aids to the patient

Vision stimulation:

Encouraging the use of vision is vital for children with low vision as it enhances their development, education and experiences. Use of vision in children having minimal amount of vision needs stimulation. Vision stimulation is the use of strong visual stimuli like colorful lights and toys to make an infant or child aware of the vision. These children usually have very limited visual capabilities and no visually guided functions.

Vision stimulation activities can help children use their remaining vision more effectively. The theory is that by performing these activities, the visual areas of the brain are stimulated to maximize the development of vision.

Parental counselling:

Parenting has no tried and tested formulas. Every child is unique, and so is every parent. What can help in the difficult task of parenting a child with visual impairments is sharing of experiences and applying them to your very own unique situation. Parents have a big role to play in helping their child gain the organizational skills necessary for success, both at school and in later life. Parenthood are all about nurturing and looking after your offspring. It is never too early to start helping your child

toward eventual independent decision making, be it grooming, self-care or self-image.

2. Educational rehabilitation:

Finding appropriate educational opportunities for visually impaired children can be quite a challenging task. Should the child be enrolled in a normal school, special school, or an integrated education? The counselor plays an important role to find out the appropriate educational mode for the children with visual important. Educational care for children with low vision includes training children directly in the effective use of their best vision. This can involve their learning to write at closer distance, to use magnifying devices, or to use creative strategies to determine what is written on a blackboard (such as asking a child seated nearby to read aloud while the teacher writes). This training is important, as it enables children to attend normal schools.

Integrated Education:

The Integrated Education Programme creates an appropriate learning and teaching environment for blind and low vision students. In this , the Specially trained teacher visits to 'regular' schools and provide useful guidance to blind students, their teachers, principals and staff in

conducting educational and co-curricular activities. They also provide braille, large print, magnifiers and audio books to these students.

Special Education:

Special education is a form of education provided for those who are not achieving, or are not likely to achieve through ordinary educational provisions, the level of educational, social and other attainments appropriate to their age, and which has the aim of furthering their progress towards these levels.

3. Vocational rehabilitation:

It assists the person who are blind in preparing for, obtaining, and retaining employment. Applicants are made eligible based upon their visual disability, their need for VR services, and their intent to work.

4. Social rehabilitation:

It helps a person to perform better in social situations and obtain functional ability. In low vision counselling, the counselor will give guidelines for the visually impaired person to carry out daily living activities and orientation & mobility.

The World Health Organization defines quality of life as 'An individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns'.

People who are registered as visually impaired are entitled to certain allowances, benefits and concessions. These are dependent upon whether the person qualifies for registration as blind or partially sighted.

ALLOWANCES :

A person registered as blind can claim an additional income tax allowance, which may be transferred to the spouse if necessary; a Disabled Person's Tax Credit is available to people in work. Either or both the care and mobility components of the Disability Living Allowance are available to people under the age of 65 years, with Attendance Allowance being available if over 65 years. Other allowances include Disability Working Allowance and Severe Disablement Allowance, and for people providing full-time care there is the Invalid Care Allowance.

BENEFITS :

People registered as either blind or partially sighted may qualify for Housing Benefit as well as Incapacity Benefit, as possible alternatives to the Job Seeker's Allowance or additional income support premiums.

CONCESSIONS :

Council tax or rates relief can be claimed in respect of structural alterations specifically undertaken for reasons arising from disability. Blind people can claim a 50% reduction on the television licence fee, and British Telecom provides a free directory enquiry service. There is free postage on articles specifically for the blind.

Blind people and the partially sighted who have mobility problems may apply for the Blue Badge disabled parking scheme. The travel concessions that are available vary according to the mode of transport, and most are dependent on where the blind person resides.

Members of Low Vision Team :

Multi disciplinary approach [36, 37] is needed for the rehabilitation of people with low vision.

- Low vision Consultant – Optometrist / Low vision clinician
- Rehabilitation Consultant – Rehabilitation Managers / Counselors

- Special educator – Specially trained resource teacher
- Orientation and mobility instructors
- Physiotherapist
- Clinical Psychologist
- Social worker
- Speech therapist
- Audiologist
- Occupational therapist

REVIEW OF LITERATURE

1. **PROFILE OF PATIENTS AT LOW VISION CLINIC IN A DEVELOPING COUNTRY** – Olusanya B , Onoja g et al : BMC Ophthalmol 2012 Jul.

   They studied the characteristics of patients presenting to low vision clinic of a tertiary hospital. The study period was 36 months. Total of 193 new patients were studied. Mean age was found to be 41.4 years with male to female ratio of 1.9 : 1 . ARMD (45.2 %) was the commonest cause in elderly patients and Albinism (24.4%) and Optic atrophy (24.4%) were the commonest in children. They also concluded that there was under – utilisation of low vision devices by elderly patients and females.

2. **LOW VISION DEPRESSION PREVENTION TRIAL IN ARMD – A Randomized clinical trial** – Rovner BW , Casten RJ et al – Ophthalmol ; 2014 Jun (14) 422 – 29.

   They compared the efficacy of Behaviour Activation (BA) with Low Vision Rehabilitation with supportive therapy (ST) with low vision rehabilitation to prevent depressive episodes in ARMD patients. The study period was for 4 months. They found that

Behavioural Activation prevented depression to a greater extent than Supportive therapy with low vision rehabilitation while there was no significant change in quality of life between the 2 groups. They concluded that an integrated Mental Health and low vision intervention reduced the incidence of depressive disorders by half compared to standard low vision rehabilitation in ARMD patients.

3. **OPTICAL AND NON-OPTICAL AIDS FOR READING AND WRITING IN INDIVIDUALS WITH ACQUIRED LOW VISION** – Monteiro MM , Montilha Rd et al – Arq Bras Ophthal. 2014 april : 77(2) 91-94.

They evaluated the use of optical and non optical low vision devices in activities like reading , writing in people with acquired low vision. The most commonly used optical aid was spectacles and the most common non – optical aid was Letter magnification . They also concluded that even after using these aids , the subject had to read the text mone than once to understand it.

4. **PREDICTING THE NEED FOR LOW VISION REHABILITATION** – O'Connor PM , Lamoureux EL et al : Br. J Ophthalmol. 2008 : 92 : 252 – 55

Studies the predictors of rehabilitation needs for people with low vision . It was done with a questionnaire to measure the quality of life consequences due to low vision. They also concluded that Visual acuity , Impact of co-morbidities on daily living , Dependence on family / friends are the strong predictors of rehabilitation needs.

5. **PROFILE OF LOW VISION CLINIC POPULATION** – NorhaniMohidin , Suzainah Yusuf et al : Clin. Exp. Optom. 1998 : 81(5) 198- 202

Studied about the clinical profile of patients presenting to low vision clinic in National university of Malaysia. The patients were studied based on Age , Date of 1st consultation , Sex , Cause of visual impairment and Types of low vision devices prescribed.

The results showed that majority (73.8%) were less than 50 years of age with male predominance (68.9%) . Congenital structural defects including nystagmus was common cause in 0 – 30 years age group , Retinitis pigmentosa among 30 – 60 years age group

and above 60 years , it is ARMD. The most commonly prescribed Low vision device wa magnifiers and spectacles.

6. **DESIGN OF THE LOW VISION QUALITY OF LIFE QUESTIONNAIRE (LVQOL) AND MEASURING THE OUTCOME OF LOW VISION REHABILITATION** – James S Wolffsohn , Anthea L Cochrane. American Journal of Ophthalmology : 2000 ; 130(6) : 793-802.

The purpose of the study was to design and validate a vision-specific quality-of-life assessment tool to be used in a clinical setting to evaluate low-vision rehabilitation strategy and management. After all the exclusions , the questionnaire had 25 items . The outcome of the study was that Rehabilitation improved the LVQOL score of those with low vision by an average of 6.8± 15.6 (17%). It is able to quantify the quality of life of those with low vision and is useful in determining the effects of low-vision rehabilitation..

7. **HOW EFFECTIVE IS LOW VISION SERVICE PROVISION ? A systematic review** – Binns AM , Bunce C , Dickinson C , Harper R , Tudor Edwards R , Woodhouse M , et al. Survey of Ophthalmology 2012 ; 57 (1) : 34 – 65.

They studied about how far were the low vision service being provided is effective . The outcome of the study was that the use of low vision aids as a rehabilitation measure helped in improving the reading ability and is much valued by people using it.

8. **PRINCIPLES OF MODERN LOW VISION REHABILITATION** – Markowitz SN. Canadian Journal of Ophthalmology 2006; 41 (3) : 289 – 312.

It stated that the following are the principles of modern low vision rehabilitation

1. The intake
2. Assessment of residual visual functions
3. Assessment of residual functional vision
4. Prescribing for low vision rehabilitation
5. Dispensing for low vision rehabilitation
6. Vision rehabilitation therapy for improvement of residual skills

9. **NATIONAL SURVEY OF THE IMPACT OF LOW VISION DEVICE USE AMONG VETERANS** – Watson GR , De L'Aune W , Stetmack J , Maino J , Long S . Optometry and vision science 1997 ; 74 (5) : 249 – 259.

They studied about the effects of change in quality of life due to the use of the low vision devices. The results were that around 15% of people stopped the use of low vision device by 12 - 24 months for the reason being it did not improve their quality of life.

10. **CRITICAL ISSUES IN IMPLEMENTING LOW VISION CARE IN ASIA – PACIFIC REGION** - Chian PP , Marella M , Ormsby G , Keeffe J . Indian Journal of Ophthalmology 2012 sep – oct ; 60 (5) : 456-459.

It described about the problems and issues that exist in implementing the effective low vision care and service and how it can be overcome.

11. **ASSOCIATION OF VISUAL IMPAIRMENT WITH MOBILITY AND PHYSICAL FUNCTION .** Salive , Marcel E , Guralnik J , Glynn RJ . Journal of the Americal Geriatric Society 1994 ; 42 : 287 – 92.

They studied about the link between the distant visual acuity and physical function in elderly age group. The better the acuity , the better was the mobility and the physical function. With effective intervention , the improvement in physical function was only half in patients with poor vision compared to patients with reasonably better vision.

AIMS & OBJECTIVES

1. To study the age distribution pattern.
2. To study the sex preponderance.
3. To study the etiology.
4. To study the Low vision aid advised.
5. To study the demographic factors.
6. To study the acceptance rate.
7. To study the quality of life of patients using LVA.

MATERIALS AND METHODS

Type of study : Hospital based prospective observational study.

Study area : Aravind Eye Hospital and Post Graduate Institute of Ophthalmology , Madurai.

Study subjects : 1049 patients

Study period : 1st July 2013 to 30th June 2014.

INCLUSION CRITERIA:

1. Patients of both sexes and all race and age groups were included in the study.
2. Only new patients to Low Vision clinic are included in the study.

EXCLUSION CRITERIA :

1. Patients with BCVA more than 6/18 in the better eye and worse than 6/18 in the other eye.
2. Patients who are already diagnosed with low vision or who are coming for follow-up visit to Low Vision clinic.

DATA COLLECTION :

History :

At the initial visit , a detailed history was obtained from each patient. This included details of ocular complaints (photophobia , night blindness etc.) , duration , laterality , family history of blindness , other relevant information like State of domicile , education and occupation . Information pertaining to each patient was collected and entered in a proforma specially designed for the case series , filled by examining doctor.

Ocular Examination :

A complete ocular examination was performed including

1. Best Corrected Visual Acuity (BCVA) on Snellen scale (LogMar scale in some) , both for distance and near.
2. Slit lamp examination of anterior and posterior segment.
3. Fixation of the eye , whether central or eccentric.
4. Direct ophthalmoscopy for fundus evaluation , supported by indirect ophthalmoscopy using +20D lens.
5. Visual field examination by Confrontation method and Bjerrum'sscreen Contrast sensitivity examination by PelliRobsonchart , Colour vision by Ishihara Pseudoisochromatic chart is done wherever possible.

Patients with BCVA < or = 6/18 in the bettereye are considered as Low vision and taken into the study. Those patients to low vision clinic who had poor vision in one eye but better than 6/18 in the other eye were excluded from the study. The patients are given a trial with low vision devices – both for distance and near , depending on their occupation and other needs. The improvement in vision with low vision aid is noted , especially for near . Depending on the patient's need and the improvement factor , low vision aid (optical or non optical) was adviced. For few patients , Rehabilitation service was recommended. The information regarding whether the patient accepted (bought) the low vision aid or not is also noted . If not bought ,the reason for not accepting it , is documented. The patients were advised to come for a follow up visit after 3 and 6 months.

A Questionnaire on "Quality of Life" was prepared and patient's response was noted before and after using Low vision aid. One score was given to each category and the response was taken as Out of 9. This is done to assess whether there was any change in quality of life of patients with low vision , after using the Low vision aid. The following parameters are taken into consideration

1. Street sign / Name board
2. Bus number / Black board — DISTANCE
3. Computer work
4. Face recognition — INTERMEDIATE
5. Reading
6. Money identification — NEAR
7. Medicine identification
8. Driving
9. Crossing street — MOBILITY

FOLLOW – UP :

Patients were examined by an ophthalmologist at the end of 3 and 6 months. On follow up visit, details regarding the following are noted

1. Type of LVD used
2. What purpose LVD is mainly used
3. How often does the patient use it
4. Compliance to LVD
5. Any improvement in quality of life after using LVD
6. Quality of Life Questionnaire
7. BCVA

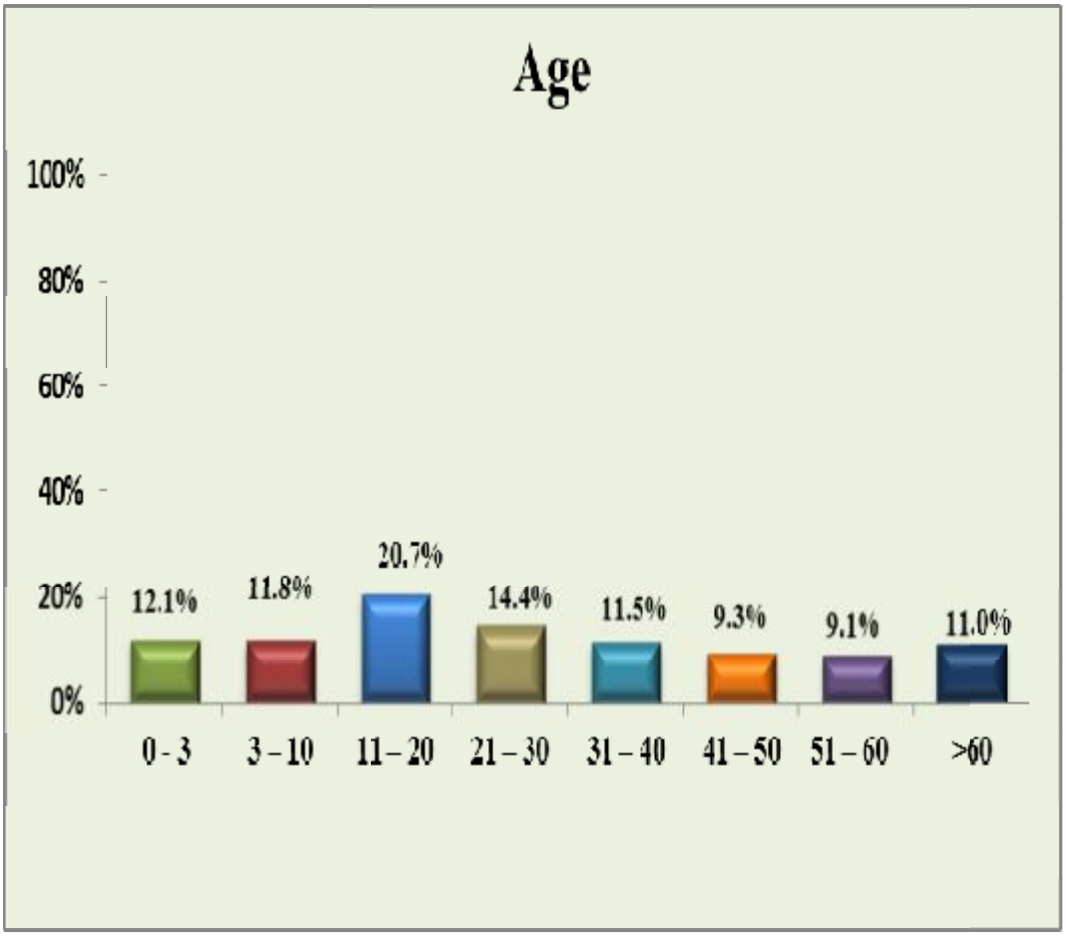
STATISTICAL METHODS

The data were describesed as Mean (SD) or frequency (Percentage) wherever as possible. All analysis done by statistical software STATA 11.1 (Texas, USA).

RESULTS

1. AGE DISTRIBUTION :

	N	%
0 – 3	127	12.1
3 - 10	124	11.8
11 – 20	217	20.7
21 – 30	151	14.4
31 – 40	121	11.5
41 – 50	98	9.3
51 – 60	96	9.1
>60	115	11.0
Total	**1049**	**100**

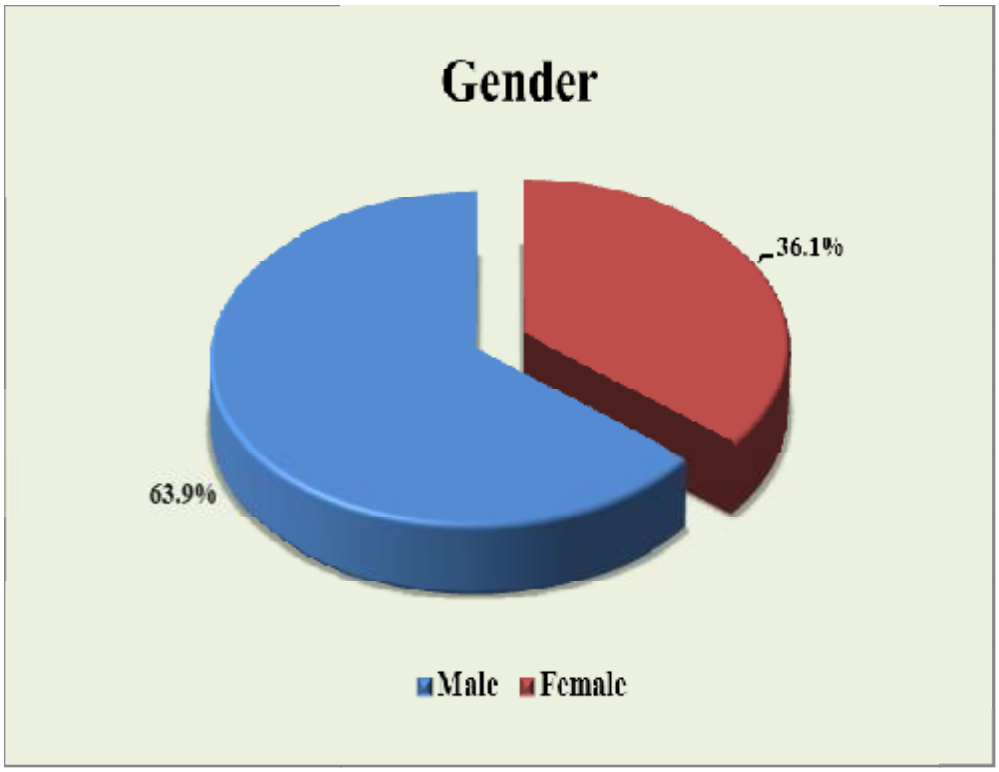


12.1% of patients were of Pre – school age (0 – 3) group and 11.8% of patients were of Primary School going children (3 – 10). Overall 44.6% of patients were less than 20 years of age .25.9% of patients were in the middle age group of 20 – 40 years. 18.5% of patients were between 40 – 60 years of age and those above 60 years accounted for 11% . The Mean (SD) age of presentation was 29.2 (10.5) Years , and the range was from 1month to 79 years .

2. GENDER DISTRIBUTION :

	N	%
Male	670	63.9
Female	379	36.1
Total	**1049**	**100.0**

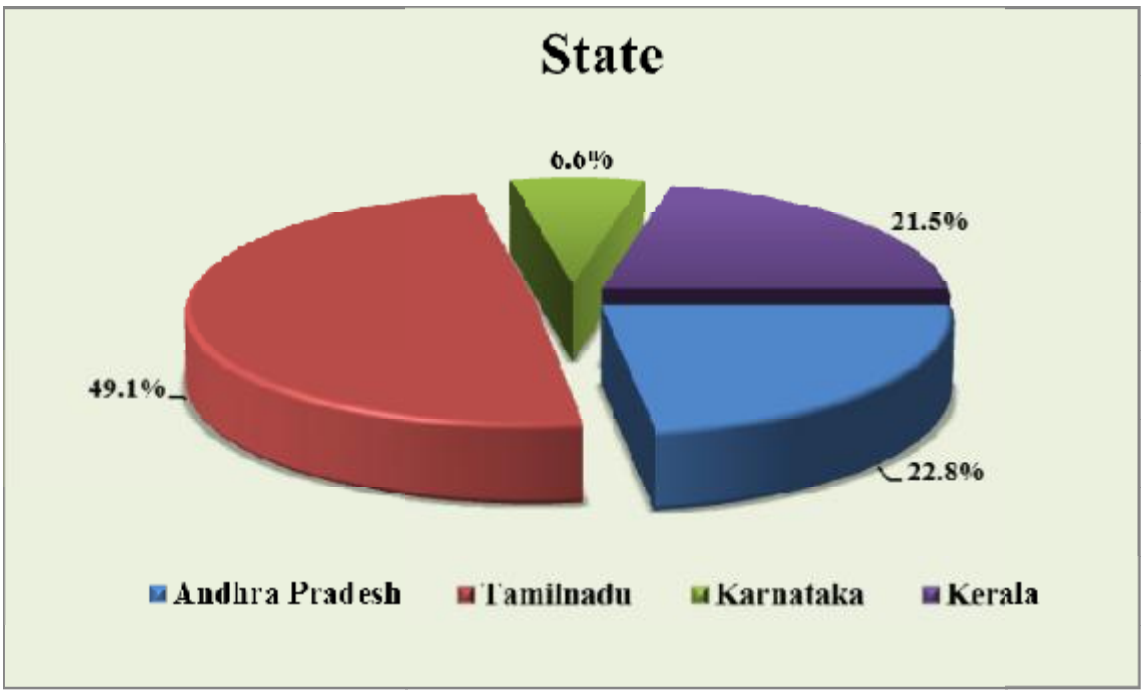
Of the total 1049 patients , 670 patients (63.9%) were males while the remaining 379 patients (36.1%) were females.



3. **DEMOGRAPHIC DISTRIBUTION** :

STATE	**N**	**%**
Andhra Pradesh	239	22.8
Tamilnadu	515	49.1
Karnataka	69	6.6
Kerala	226	21.5
Total	**1049**	**100**

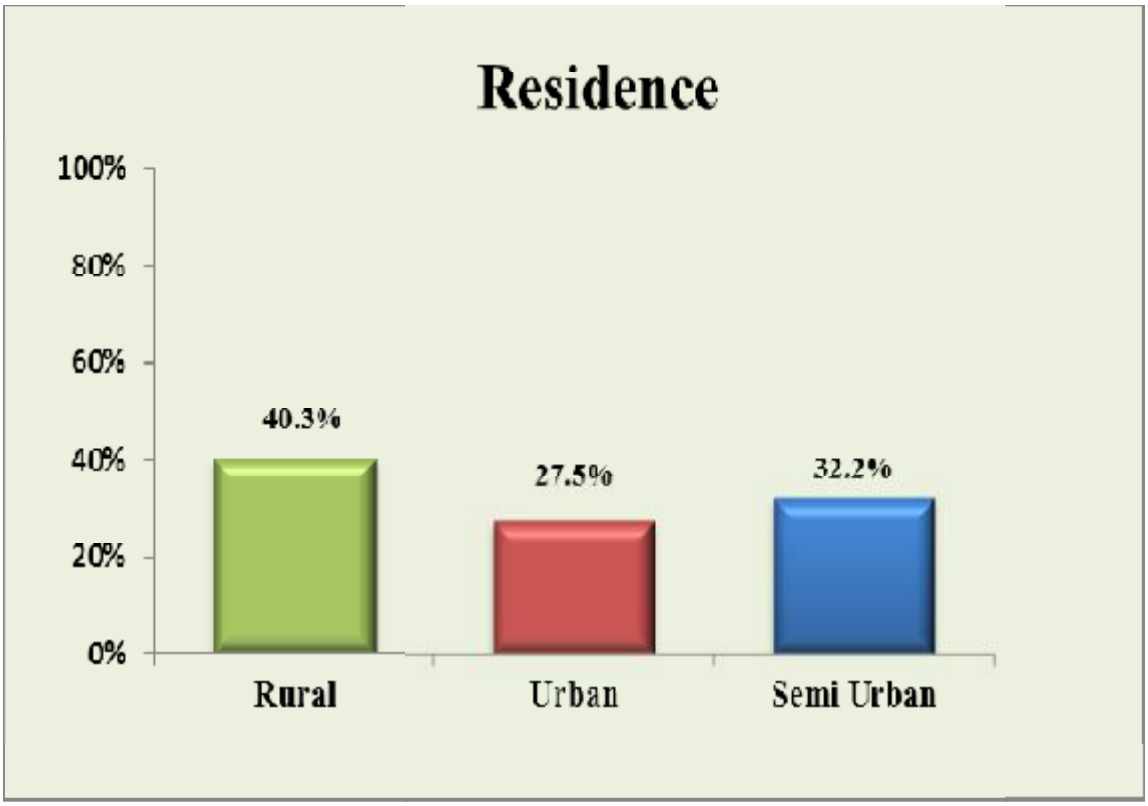
Most of the patients were from Tamilnadu state (49.1%) , which can be attributed to institutional location in Tamilnadu state. 22.8% of patients were from Andhra Pradesh while 21.5% were from Kerala. Least number of patients (6.6%) were from Karnataka .



4. **RESIDENCE** :

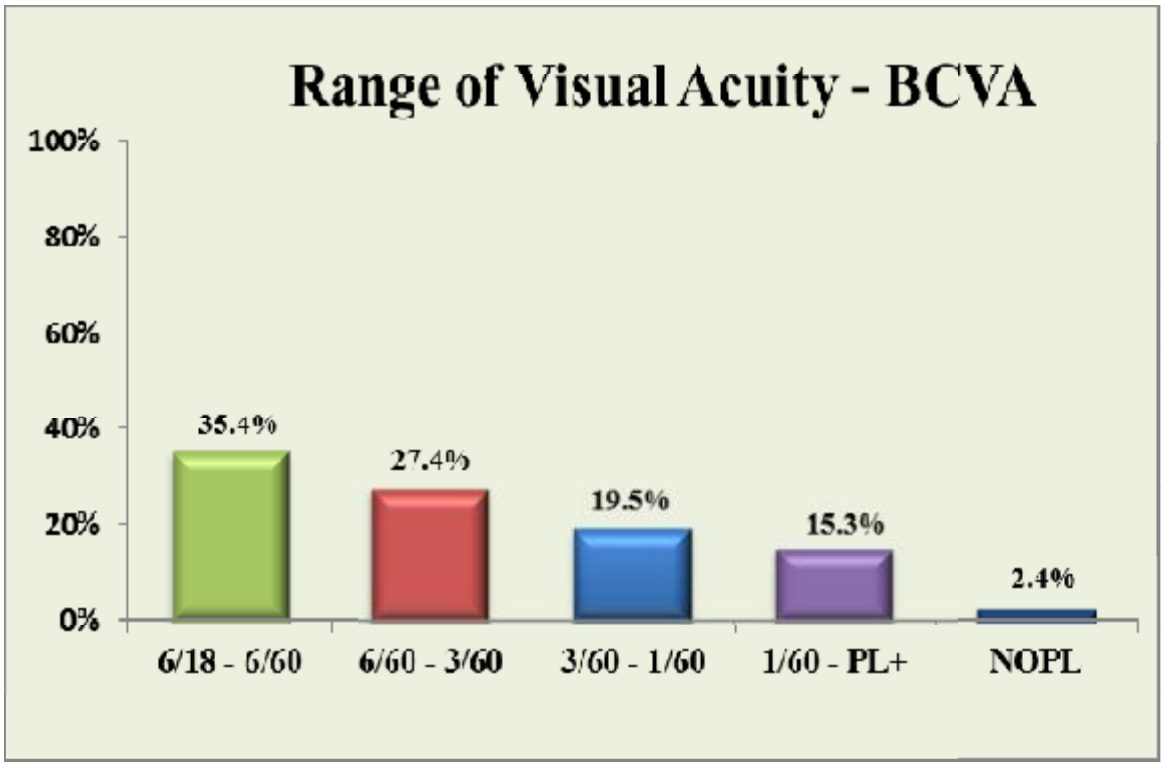
	N	%
Rural	423	40.3
Urban	288	27.5
Semi Urban	338	32.2
Total	**1049**	**100**

Most of the patients were from rural background (40.3%) . Least number of patients were from urban background (27.5%) .



5. **RANGE OF VISUAL ACUITY** :

BCVA	N	%
6/18 – 6/60	371	35.4
6/60 – 3/60	287	27.4
3/60 – 1/60	205	19.5
1/60 – PL+	161	15.3
No PL	25	2.4
TOTAL	**1049**	**100**

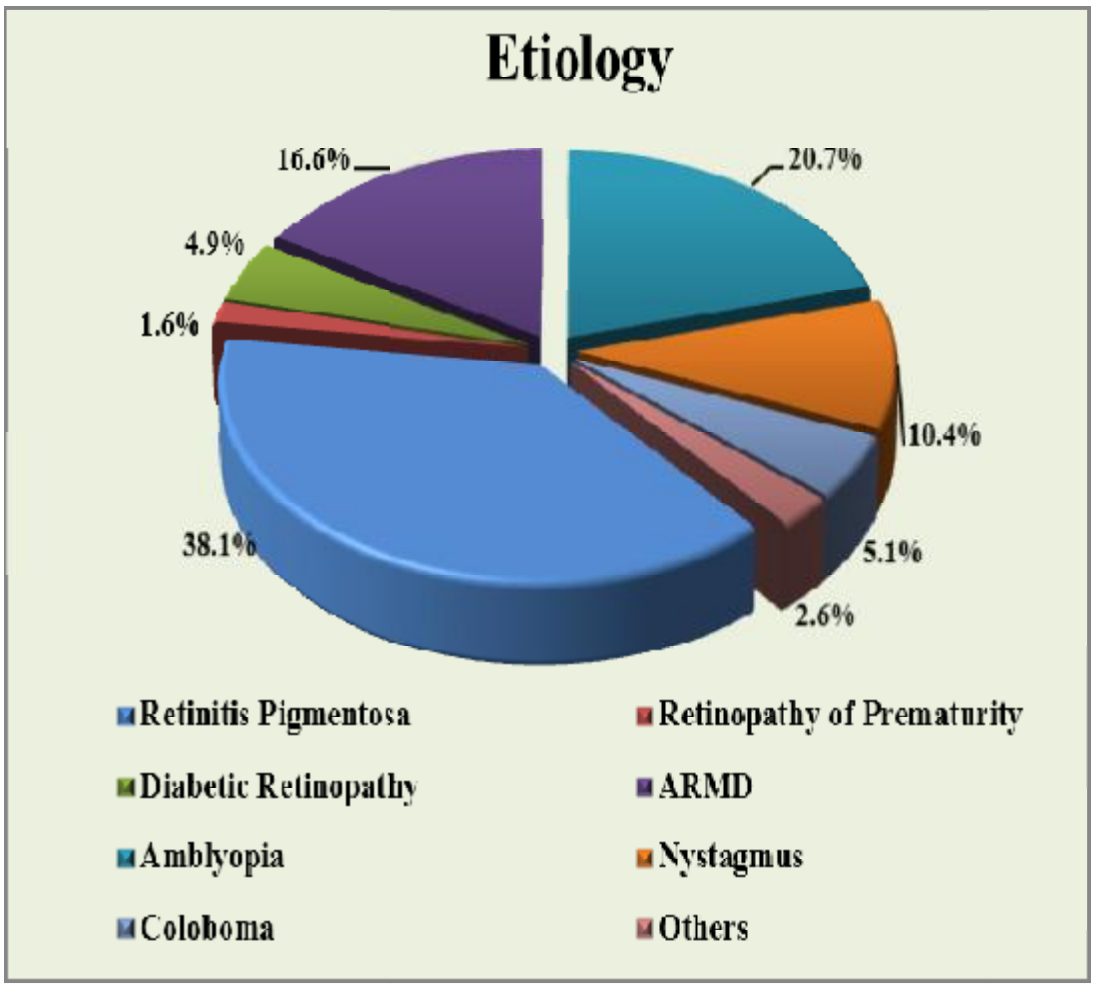


BCVA of the better eye is studied in all patients . 35.4% of patients had vision in better eye between 6/18 – 6/60 . 27.4% ofpatients had vision between 6/60 – 3/60 in the better eye. 37.2% of patients had vision worser than 3/60 in the better eye , amongst which 2.4% of patients had no Perception of light .

6. **ETIOLOGY** :

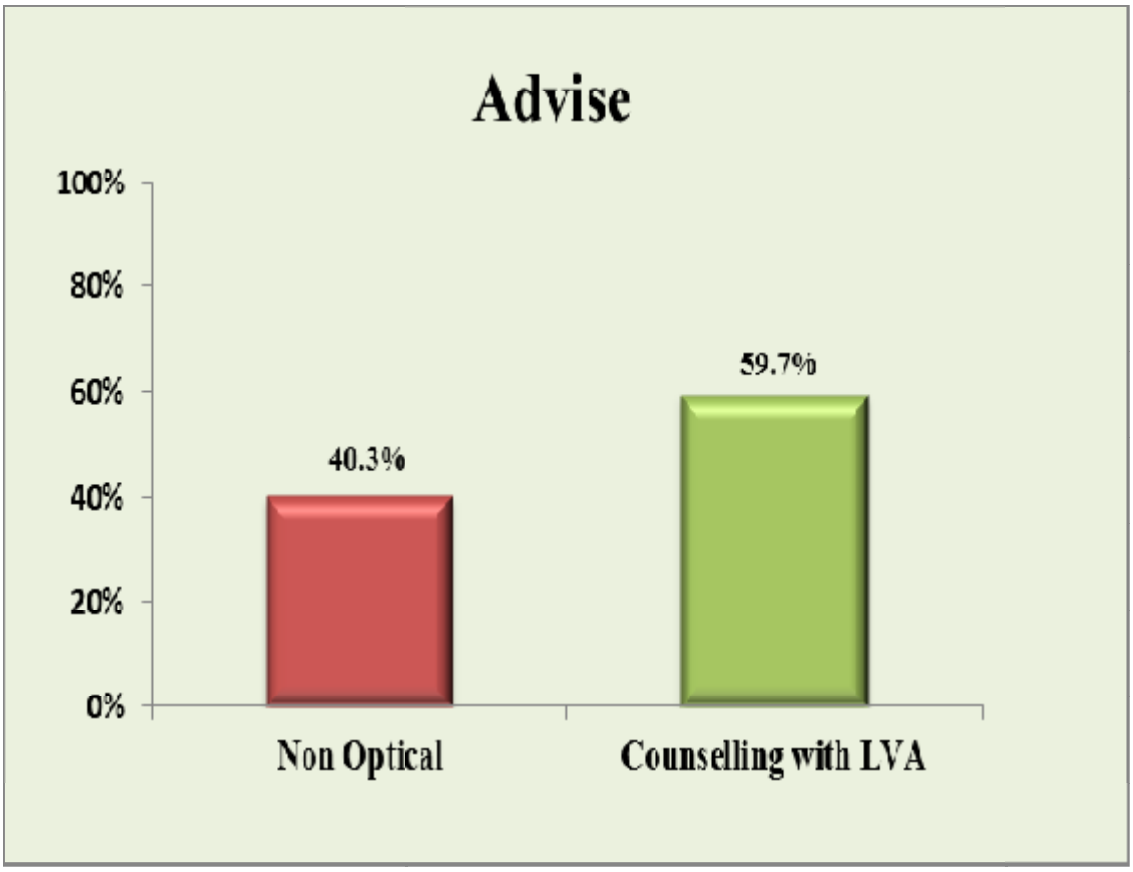
	N	**%**
Retinitis Pigmentosa	400	38.1
Retinopathy of Prematurity	17	1.6
Diabetic Retinopathy	51	4.9
ARMD	174	16.6
Amblyopia	217	20.7
Nystagmus	109	10.4
Coloboma	53	5.1
Others	28	2.6
Total	**1049**	**100.0**

38.1% of patients had Retinitis Pigmentosa , 20.7% of patients had Amblyopia , 16.6% of patients had Age Related Macular Degeneration . 4.9% of patients had Diabetic Retinopathy while 1.6% of patients had Retinopathy of Prematurity. Patients in the Others category were 4 patients with Microophthalmia , 4 patients with Macular scar , 2 patients with Congenital Glaucoma , 7 patients had Primary Optic Atrophy , 7 patients with Temporal pallor and 4 patients with Optic Neuropathy .



7. ADVISE :

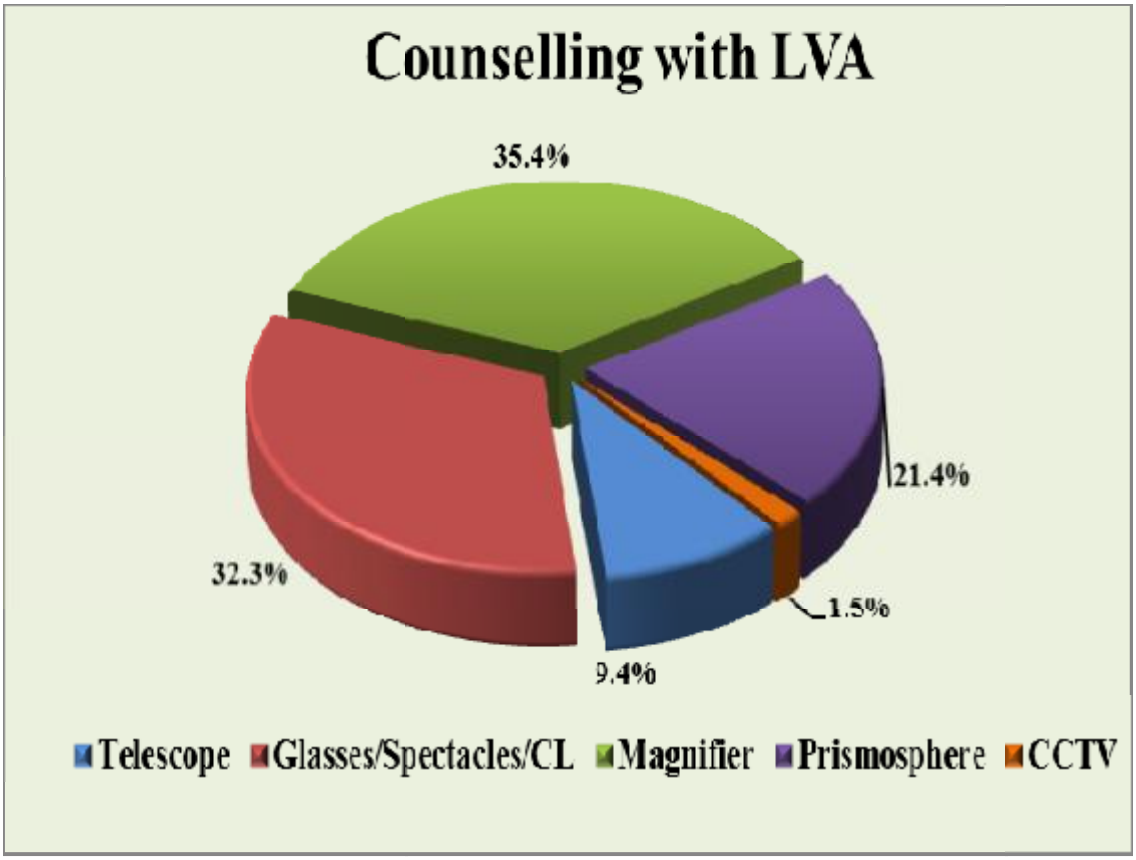
Advise	N	%
Non Optical	423	40.3
Counselling with LVA	626	59.7
Total	**1049**	**100.0**

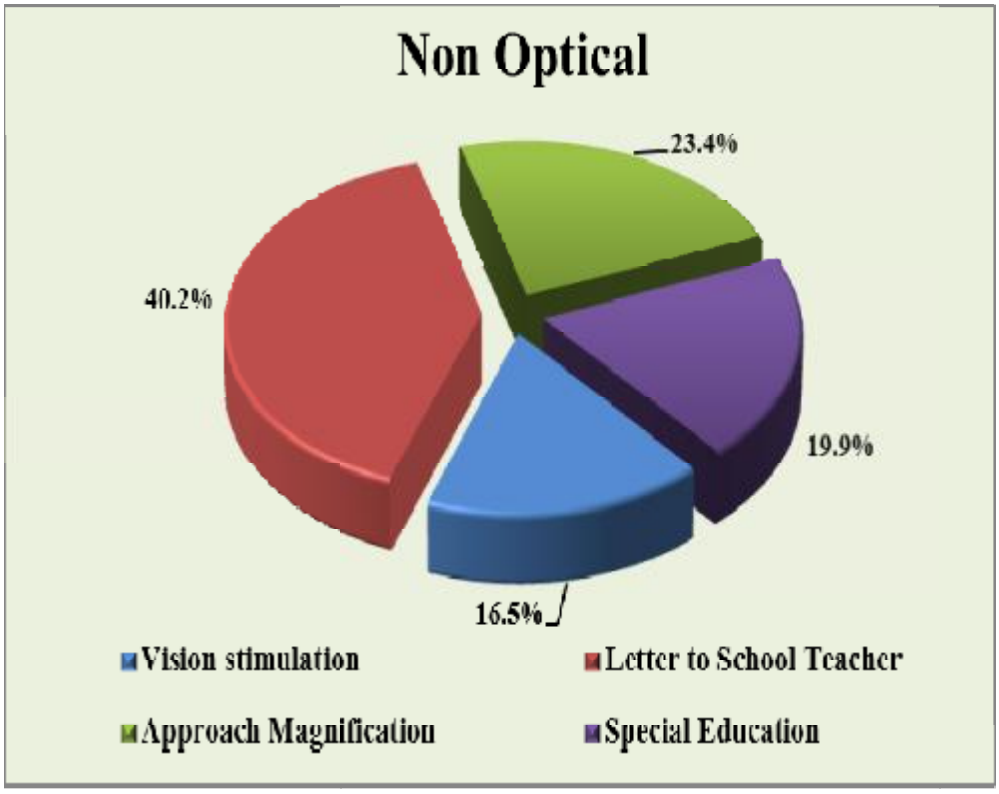


	N	%
COUNSELLING WITH LVA		
Telescope	59	9.4
Glasses/spectacles/CL	202	32.3
Magnifier	222	35.4
Prismosphere	134	21.4
CCTV	9	1.5
Total	**626**	**100**
NON OPTICAL		
Vision stimulation	70	16.5
Letter to School Teacher	170	40.2
Approach magnification	99	23.4
Special education	84	19.9
Total	**423**	**100.0**

The advise for the low patients were either non optical methods or counselling with trial of low vision device. Since majority of the patients in our study were within 20 years of age , non optical

methods of rehabilitation were given to nearly 423 patients (40.3%). These were in the form of Vision Stimulation, giving letter to school teacher explaining about the vision of the child and making the child sit in the front row of the class , Approach magnification , thereby bringing the object close to the eye and visualising so that it appears enlarged . Other aspects of counselling were about the vocational rehabilitation , Special education etc.

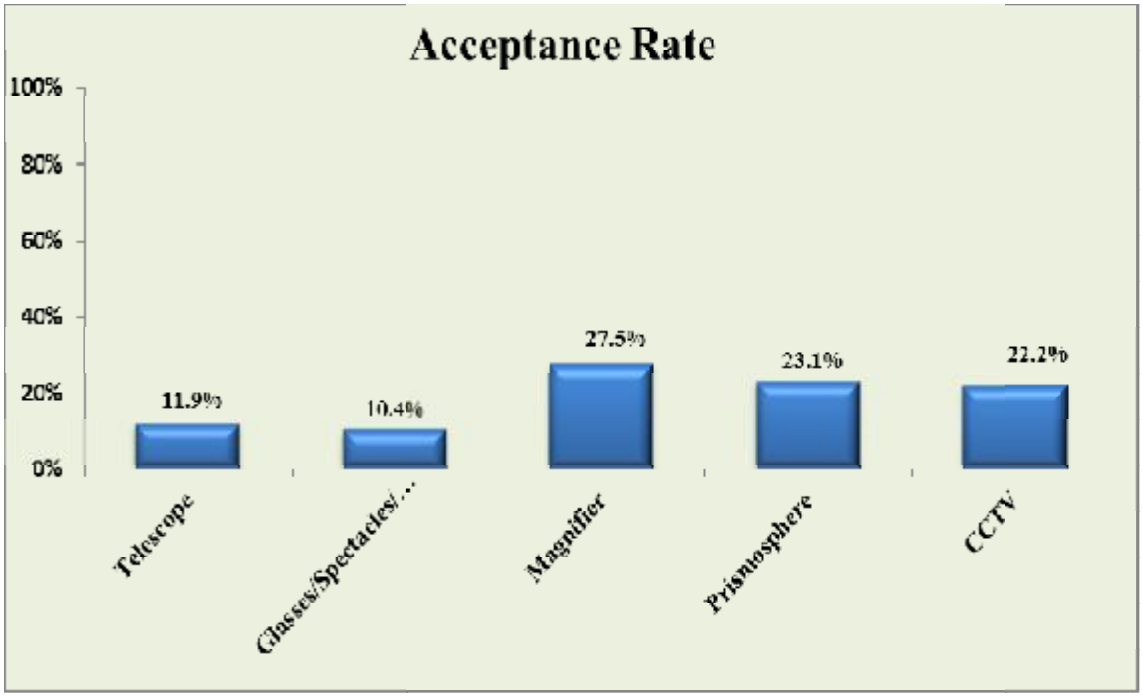




626 patients (59.7%) were given counselling and also made to do a trial of low vision device . The low vision device was chosen based on various factors like magnification , patient's needs , cost etc. Majority (35.4%) of the patients were advised to use Magnifiers . 32.3% of patients were advised to use Spectacles or Contact lens (with magnification) . 21.4% of patients were advised to use Prismosphere while Telescope was advised for only 9.4% of patients . Considering the cost and other factors , CCTV was advised for only 1.5% of patients .

8. ACCEPTANCE :

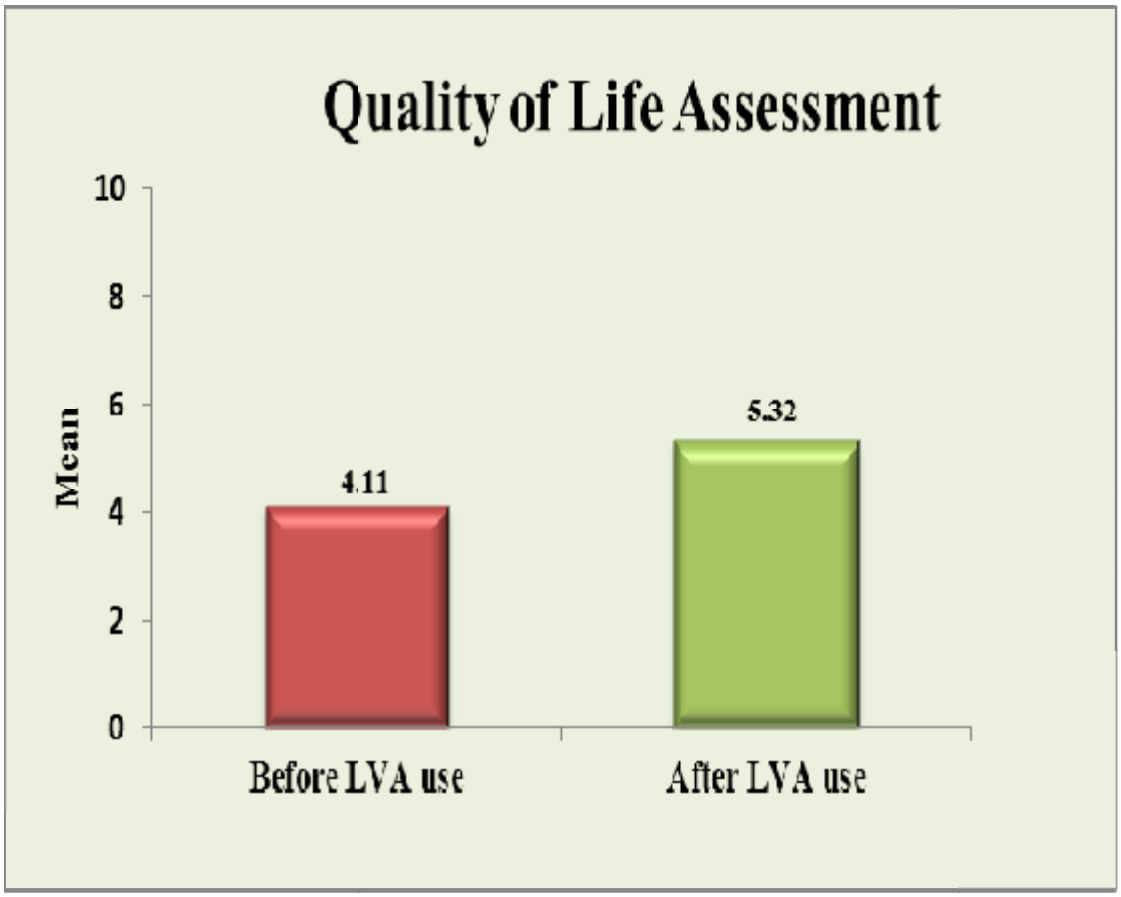
	Advised (n)	accepted (n)	Acceptance rate (%)
Telescope	59	7	11.9
Glasses / Spectacles / CL	202	21	10.4
Magnifier	222	61	27.5
Prismosphere	134	31	23.1
CCTV	9	2	22.2
TOTAL	**626**	**122**	**19.5**



Among the 626 patients who were advised to use the Low vision device , only 122 patients bought the device , which shows an acceptance rate of 19.5% in total . The acceptance rate was more for Magnifiers and Prismospheres.

9. **QUALITY OF LIFE ASSESSMENT :**

	N	Mean(SD)	Min-Max	P-Value
Before LVA use	122	4.11(1.38)	0 – 6	**<0.001**
After LVA use	103	5.32(1.72)	0 – 8	



Out of the 122 patients who bought the low vision devices , only 103 patients turned up for the follow-up visit . The Mean Quality of Life assessment score (out of 9) before accepting LVA was 4.11 , with a standard deviation of 1.38 . The minimum and maximum score ranging from 0 to 6 .

The Mean Quality of Life assessment score (out of 9) after using the LVA was 5.32 , with a standard deviation of 1.72 . The minimum and maximum score ranging from 0 to 8.

This shows that there was statistically significant improvement in the quality of life of patients who used the Low vision devices.

DISCUSSION

The estimate of people in the world with low vision is nearly 246 million. It remains as one of the major global health issue , which could be well managed by intervening at the correct time and with correct technique to enhance their vision.Friedrick *et al*[17] described about the Blindness and Visual impairment as a major public health issue both for the present and for the future.

1049 patients with low vision , within our inclusion criteria were studied in this series. The study period was from july 2013 to june 2014 . The clinical profile of all the patients in the study were analysed in detail and the impact of low vision devices on the quality of life of these patients were studied.

The Mean age of presentation was 29.2 years . 21.3 % of patients were in 11-20 years age group which was comparable to the series of patients studied by SA Khan *et al*[18], who found that patients in 11 – 20 years age group was 21% .The distribution of the age group in our study showed that 59.4 % of patients were below 30 years of age and 11% of patients above 60 years . Males accounted for 64% while females were 36%. SA Khan *et al*[18] reported that 46% of patients to be within 30 years of age and 18% above 60 years of age ,

with males predominating overall (72% %) . Consanguinity of parents was present in 27% of patients.

Khan *et al*[18] reported that patients with visual acuity between 6/18 – 6/60 were 49.3% in his study while in our study 35.4% of patients had BCVA of the better eye between 6/18 and 6/60 , 27.4% of patients were between 6/60 and 3/60. Rest of the patients had BCVA worser than 3/60 with 2.4% of patients having no perception of light.

David *et al*[16]did study in a series of Vision disabled elderly people and found that majority (65%) of the patients were women and the most common cause of such visual disability being Age related Macular Degeneration (75%) . The most common cause of low vision in our study was Retinitis Pigmentosa (38.1%) , followed by Amblyopia (20.7%) and Age Related Macular Degeneration (16.6%) . SA Khan *et al*[18] in his study , reported the common causes being Retinitis Pigmentosa (19%) , followed by Macular diseases (17.7%) , Diabetic Retinopathy (13%) and Myopic degeneration (9%) . Since the vast majority of the patients in our study were in the less than 30 years age group , the etiology for the low vision was quite different from the above two studies .

Congdon*et al*[13] found that the leading cause of low vision among whites was Age related macular degeneration while it was glaucoma and cataract among the blacks . Also reported in this study was above 40 years of age , nearly 1 in 28 Americans are either blind or with low vision .

Vijaya*et al*[14] reported a positive association of blindness and low vision with illiteracy and age. The major cause of blindness in this study was Cataract (57.6%) followed by Glaucoma (16.7%) while that of low vision was Refractive error (68%) followed by cataract (22%).

In the study by Silver et al, (Silver et al. 1995) which included 230 children at a school for the blind, visual acuity was used to determine the need for magnification or glasses. The majority of these children (57%) were only taught Braille and treated as totally blind, although 79% of these children could benefit from near low vision devices or reading spectacles and be enabled to read normal print. This study raises the importance of magnification, and the effect on the children's academic life. This study also reported that stand magnifiers seem to be the easiest optical magnifiers for children to use.

In our study 49.1% of patients were from Tamilnadu , 22.8% of patients were from Andhra Pradesh and 21.5% of patients were from Kerala. Majority of the patients in our study were from a rural background . The general awareness of the people about the causes of low vision and about the low vision aids is low among these people and which explains the increasing number of them with low vision. A high level of motivation is needed to educate these people about the low vision devices and its importance in the life of people with low vision.

According to Gompel et al, (Gompel et al. 2004) visual field defects do not affect children's reading speed and comprehension. This study compared two groups of children with low vision. The first group included children with low vision who had visual field restrictions and the second group were children with low vision and intact visual fields. Interestingly, no difference in reading speed and reading-comprehension skills were found between these two groups of children with low vision. This is the only study on the effect of visual field constrictions on reading speed rate in children with low vision. More studies need to investigate the importance of field of view on reading speed in children with low vision.

In our study , 423 patients (40.3%) were given advise on Non optical devices and methods , in the form of Vision stimulation exercise , Letter to school teacher , Approach magnification etc.. Letter to school teacher insists upon the visual potential of the child , the necessity to make the child sit in the front row of the class , to pay extra attention to the child , to do regular eye check up and to make other children to understand the condition of the affected child . Approach magnification relies on bringing the book or any object close to the eye to see it better . These are some of the rehabilitative measures which would improve the residual vision of the child and help in doing the regular activities. Since majority of the patients in our study were children , the importance of these rehabilitative measures must be explained to the parents and they need to be counselled well.

626 patients (59.7%) were given counselling followed by trial of low vision devices . Some of the common devices which were advised for trial are Magnifiers , Telescopes , Prismospheres , Magnifying glasses , CCTV etc. 222 patients (35.4%) were advised to use Magnifiers , which included 3X Pocket Magnifier , 4X Dome Magnifier , 6X Pocket Magnifier , 4X Hand Magnifier , 6X Cutaway Magnifier. Spectacles or Magnifying glasses were advised for 202

patients (32.3%) while Prismospheres were advised for 134 patients (21.4%) , which included 5D Prismosphere , 8D Prismosphere and 10D Prismosphere . SA Khan *et al* [18] reported in the study that majority of the patients were given Spectacle magnifiers , followed by glasses and telescopes . Among the non optical devices , the most commonly prescribed ones are reading lamps , light control devices and mobility canes .

Watson *et al* reported about the reading speed with various types of spectacle magnifier. For reading Comprehension , Hybrid diffractive spectacle magnifier was effective while the print size looks better with aplanatic spectacle magnifier . Overall many patients preferred using hybrid type magnifier .

Margrain*et al*[15] reported that the use of suitable low vision device helped in improving the near visual acuity in nearly 88% of the patients.

The acceptance rate in our study was 24.3% for the magnifiers followed by 20.4% for the prismospheres . The overallacceptance rate was only 19.5% . The reason which could be attributed for such low acceptance rate would be due to rural background of majority of the people , lack of awareness about the medical advances and the low

vision aids , cost factor and psychological factors .Binns *et al* reported in the study that the rehabilitative services providing low vision devices helped in improving the reading ability of the patients and also much preferred by the users.

The Quality of Life questionnaire score in our study showed a significant increase in those using low vision aids . It showed a mean increase from 4.11 to 5.22 which is statistically significant .The improvement was mainly due to the enhancement of near vision . Robert *et al* [19]interpreted the low vision rehabilitation outcome measures using questionnaires with rating scale. Tiffany *et al*[20] compared the probability of low vision rehabilitation's success by comparing the clinician's predictions with the patient's outcomes and concluded that the clinician's predictions doesn't agree with the changes observed in functional ability from the patient's perspective.

In the educational setting , questions arise regarding the capabilities of the student , as well as needs for glasses or low vision devices. How the glasses or low vision devices should be used , instructional tips in using the devices , and suggestions for preferential seating or modifications in the environment are some of the important that should be included. These reports tend to be more

detailed and should be written in lay terms , as they will be used by parents , teachers , therapists and other s who may not be knowledgeable about medical or ocular terminology. A statement regarding the size of print as well as the distance the material is held is much more helpful. Issues such as efficiency , practicality and student's acceptance of low vision device are all important pieces of information that may play a role in the student's educational setting.

LIMITATIONS

Though we elaborately studied the demographic features , various low vision devices advised , rehabilitative measures , acceptance rate and the change in quality of life of patients , still some lacuna exists in this study . –

1. The parental consanguinity is not being taken into account in the study.
2. As this hospital (Aravind Eye Hospital) is a tertiary care hospital all difficult end stage cases are only referred to this hospital and hence the actual number of patients with low vision would be much more in the community . – Referral Bias.
3. We followed up all the patients for a maximum of 6 months. A longer follow up might give better evaluation of the effectiveness of low vision devices and quality of life of patients.

SUMMARY

- Children less than 10 years were the most commonly affected.
- Males were more affected.
- More patients of rural background
- Low acceptance rate of low vision devices .
- Significant improvement in quality of life of patients who accepted the assistance with Low vision devices .

CONCLUSION

Low vision remains a global health issue and India alone accounts for a major portion of it . It can occur from as early as soon after birth to old age , which necessitates the importance of regular eye check up since childhood , in order to avoid major eye illness in the future. Few school teachers must be trained under the School screening programme , to pick up the eye disorder of the child at a earlier stage . In the old age , strict control of diabetes and hypertension is needed . The increased number of patients with bilateral low vision also depicts the problem load.

The people of the rural background are not much educated about the health problem and its consequences . Awareness must be created among those people about the health problems , eye related disorders , low vision devices. This would help in increasing the acceptance rate and improving their quality of life.

- In case of pre – school children and infants , early identification and rehabilitation is needed.
- For school going children , Proper guidance , co-operation with school teacher in proper identification and management.

- Special trainingabout early identification for selected teachers in all schools.
- To incorporate an Integrated education in schools.
- To include in Primary eye care programs about the effective measures to make and early identification and referral of patients who would benefit from the rehabilitation services.
- Educate people about services and rehabilitative measures available for the low vision people .
- To promote self and family motivation and confidence.
- To promote Community based rehabilitation.
- To study in detail about the cost effectiveness of the low vision devices .

With early recognition , effective and appropriate rehabilitation , regular follow up , the burden of low vision could be well tackled .

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PROFORMA

CLINICAL STUDY OF PATIENTS PRESENTING TO LOW VISION CLINIC IN A TERTIARY EYE CARE HOSPITAL

STUDY NO. ……..

Name ……. Date ……

Age ……..M.R.No. ……

Gender …….. M – Male , F – Female

Address …… Diagnosis ……..

…… Background ……

…… R – Rural , U – Urban , S – Semi Urban

State of domicile ……

Phone number ……..

……

History & Complaints :

If child , education : Normal / Integrated / Special

Other associated disability : …….

Dark / Light adaptation delayed : Yes / No

Night blindness : Yes / No

Photophobia : Yes / No

……

Low Vision Assessment :

Quality of life questionnaire :

	Problem with	**Score**
DISTANCE	Street sign / Name board	
	Bus number / Black board	
INTERMEDIATE	Computer work	
	Face recognition	
NEAR VISION	Reading	
	Money identification	
	Medicine identification	
MOBILITY	Driving	
	Crossing street	
TOTAL		

Score : 1 – For each reply as 'NO' in the above questions

0 – For each reply as 'YES' in the above questions

……

Low Vision Refraction Work up :

Visual acuity	**Distance vision**		**Near vision**
	RE	LE	
Without correction			
With present glass			
With new correction			

Chart used : …… Distance : ……..

BCVA of the better eye : ……

Visual field : Normal / Defective / Contraction / Tubular

Contrast Sensitivity : Normal / Defective

Colour Vision : Normal / Defective

……

Trial with Low Vision devices :

Distance vision

Telescope trial : Hand held telescope ☐

Spectacle mounted telescope ☐

Clip on telescope ☐

Power of the telescope : …… Unaided vision : RE ….. LE ……

Vision with telescope : ……

Near Vision

Spectacle magnifier ☐ Hand magnifier ☐

Stand magnifier / Dome magnifier ☐ Prismosphere ☐

Electronic Low vision aids ☐

Power of LVD ……..

Non optical device recommended : …….

Rehabilitation service recommended : ……..

Patient interested in LVA : Yes / No

Obtained LVA : Yes / No

If No , then reason : ……

Comments / Remarks : ……..

Review date : …… Signature : ……

PROFORMA FOR FOLLOW UP VISIT

STUDY NO. ……..

Name …….. Date ……

Age …….. M.R.No. ……

Gender …….. M – Male , F – Female

Address …… Diagnosis ……..

…… Background ……

…… R – Rural , U – Urban , S – Semi UrbanState of domicile ……

Phone number …….

……

Does the patient use the Low vision devices : Yes / No

If yes , type of the LVD and power ……..

What purpose do you use the LVD for ?

Near vision / Distance vision / Intermediate vision

How often do you use it ? Regularly / Occasionally

Compliance to low vision device : Good / Poor

Has the low vision device improved the quality of life ? Yes / No

Low Vision Assessment

Quality of life questionnaire :

	Problem with	**Score**
DISTANCE	Street sign / Name board	
	Bus number / Black board	
INTERMEDIATE	Computer work	
	Face recognition	
NEAR VISION	Reading	
	Money identification	
	Medicine identification	
MOBILITY	Driving	
	Crossing street	
TOTAL		

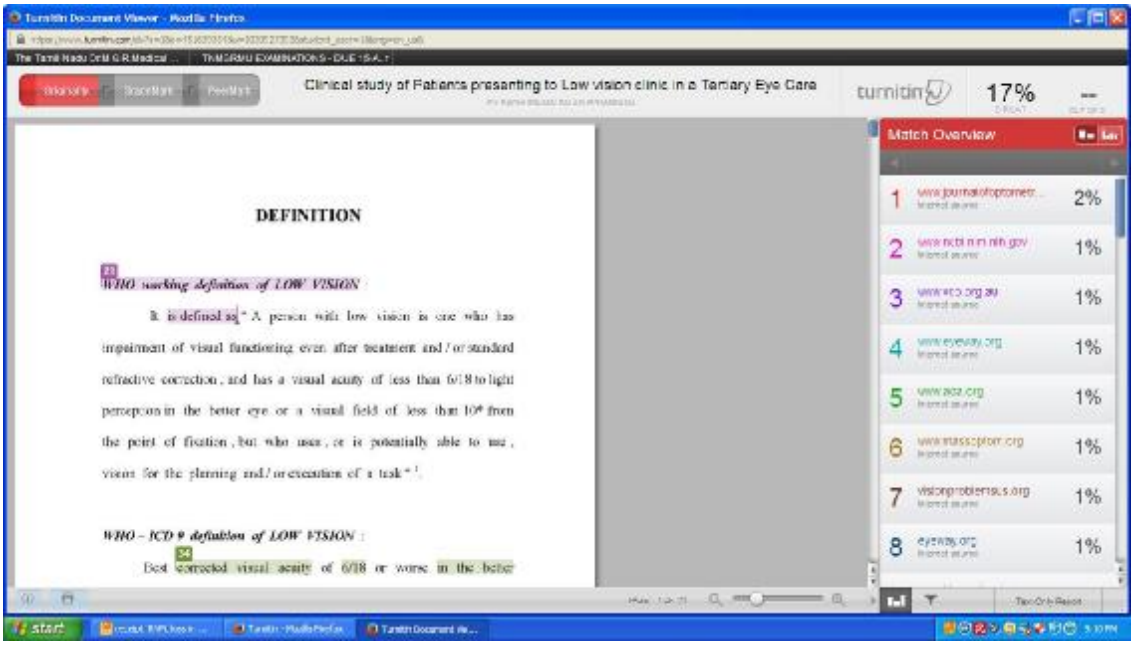
Score : 1 – For each reply as 'NO' in the above questions

0 – For each reply as 'YES' in the above questions

……

Visual acuity

Visual acuity	**Distance vision**		**Near vision**
	RE	LE	
During previous visit			
Present acuity with correction			
With present LVD			


Clinical study of Patients presenting to Low vision clinic in a Tertiary Eye Care
17%
Match Overview
1 2%
2 1%
3 1%
4 1%
5 1%
6 1%
7 1%
8 1%
DEFINITION
WHO working definition of LOW VISION
It is defined as " 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 in the better eye or a visual field of less than 10° from the point of fixation , but who uses , or is potentially able to use , vision for the planning and/ or execution of a task " .
WHO – ICD 9 definition of LOW VISION :
Best corrected visual acuity of 6/18 or worse in the better

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