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# An Overview of Low Vision Aids

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***Authors' contributions***

*This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.*

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## ABSTRACT

Low vision is something that will cause hindrance in one's daily activities. These problems are on the rise amongst the Indian population nowadays. Low vision is one of the emerging problems which needs immediate attention. Blindness is one of the most critical aspects of low vision. In a survey conducted at the national level in 1989-90, approximately 12 million people of India accounted for about 1.5% who were blind presented with a visual acuity of about <6/60 in the eye with better vision. Visual impairment possesses a financial burden, which is why we cannot pay attention to it . Funding by the government in this sector should be the thing which should be taken care of. The rehabilitative purpose of low aids is to help people perform their daily chores without any disturbances. Low vision aids are different depending on different age groups of the population. Spectacles are commonly used measures to correct low vision, but they are not socially acceptable. There is a stigma still associated with spectacles, so the person wearing them feels insecure about it. Low vision is not always necessarily associated with any disease of the eye. Negligence associated with low vision causes an increase in the number of blind cases overall. Depending upon the type of visual loss, appropriate corrective measures can be brought into force. In the current scenario, covid-19 is also one of the leading causes of the growing number of eye diseases globally due to the online platforms used.

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## 1. INTRODUCTION

According to a National survey done in 1989-90 reported that 1.5% of the Indian population (12 million people) were blind with a presenting visual acuity of <6/60 in the bettereye[1].

### 1.1 Visual Acuity Includes Three Components

a) Minimum visible
b) Minimum resolvable: Separation between two points such that they are visible separately
c) Minimum discriminable

In the tenth revision of the World Health Organisation International Statistical Classification of Diseases, Injuries, and Causes of death, low vision is defined as Visual Acuity of less than 6/18 but equal to or better than 3/60, or a corresponding visual field loss to less than 20degrees, in the better eye with best possible correction [2]. It includes factors causing low vision, prevention, and treatment of various disorders leading to low vision.

Around the globe, the percentage of people having a visual impairment and using proper visual aids is very high. There is no exact information about this since people do not approach treatment the properly. From the above, it is evident that the number of people with low vision increases.

According to some studies conducted, at the age of 45, less than 1% of people are likely to have low vision, but by the age of 75, that jumps to almost 5%, and then to 15% by the age of 85 [3]. In developing countries, visual impairment is a growing public health problem that needs proper attention for its management.

Currently, there are about 12 million blind people in India. India holds approximately one-third of the blind population of the world. In 2020, an estimated 596 million people had distant vision impairment worldwide, of whom 43 million were blind [4].

The main factors contributing to this mountain of low vision aid problems are various diseases causing it, lack of interventions, and poverty. The poor people cannot afford it.

In children, the diseases that lead to vision loss are cataracts, trachoma, night blindness, glaucoma, amblyopia, and nystagmus.

In the elderly population, the mainly macular degenerations account for most of the cases followed by glaucoma and various pathological conditions causing vision loss like diabetic retinopathy.

Low on aids that the devices designed to improve vision for any person to lead a normal healthy life. The devices can be optical as well as non-optical. Optical devices include near as well as distant vision. For near vision, plus power spectacles, magnifiers which are hand held and telemicroscopic devices are used. For distant and intermediate vision, telescopes of various types i.e. monocular, binocular, focusable etc are used. Telescopes can be Galilean, Keplerian, hand held talking versions of calculators, watches, weighing machines and glucose monitors are available in market for low vision patients, Non-optical devices include improvement of physical comfort, contrast enhancement, control of lighting. The patients should be provided with appropriate lighting so that they can use their remaining vision maximally. The places like stairs, corridors, kitchens, closets, should be provided with adequate lighting which is glare free so that the patient can perform activities of their daily living. Raising the edges of stairs and corridors can be done using contrasting paints and tapes.

Some efforts have also been put in developing high tech devices, these are as follows- retinal prostheses, head-borne electronic glasses, navigation aids etc.

The treatment of these diseases should be cost effective so that it can be affordable by anyone. Devices such as magnifying glasses have been proven to be helpful. They have been modified by including inbuilt lights and illuminating options so that they can be placed over the reading book and therefore assist them in reading. Telescopic magnifiers also help in low vision.

## 2. OBJECTIVES

**To provide the readers with:**

1. An overview of low vision aids

2. Overview of various factors leading to low vision
3. Overview of the common methods available for treatment of various disorders
4. Overview for importance of visual aids

## 3. MATERIALS AND METHODS

Pub Med and Google search engine were used to search the following key terms- “low vision”, “devices used for low vision”, “number of cases world wide and in India”, “corrective measures”, “low vision aids”, “stigma associated with use of spectacles”, “sustainable development goals”, “ national programme for control of blindness” and from the results of these search such as articles and news were selected and used for writing this review. Tools from Microsoft word were used to create the pie charts, tables, and other illustrations.

### 3.1 An Overview

Low vision simply means the vision which cannot be completely corrected by surgery, medication, spectacles or by contact lenses. Low vision is more commonly found in people with severe eye diseases and can be tested by Snellen’s chart of visual acuity.

Low vision is not age specific, it can be found in a person of any age group but more commonly it is found in the elderly population.

Let me tell you about various causes which can lead to low vision – macular degeneration which can cause blurred central vision; diabetic retinopathy which can cause visual distortions; glaucoma can lead to a vision known as tunnel vision; retinitis pigmentosa (i.e. vitamin A deficiency) causes inability to see in dark; optic neuropathy. Low vision can be better defined in terms of function rather than mere test results. In case anyone finds it difficult to struggle with day to day activities because of low vision one must undergo an eye checkup. Vision can be linked to educational performances. Those children having vision impairment can be generally associated with poor educational outcomes.

The key factor required in promotion of rights of people with visual impairment is by improving the functional abilities, one can achieve this by providing them with easy accessibility to rehabilitative services and by strengthening our laws and policies.

In order to achieve this we have established various sustainable development goals. The united nations sustainable development goals are a group of broad target-driven goals for 2030, designed as a “blueprint to achieve a better and more sustainable future for all”[5]. Eye health is benefitted if we make tremendous progress in sustainable development goals.

According to the National programme for control of Blindness(NPCB) its goal was to reduce the prevalence by 2020 to 0.3%. currently the programme is changed and now it is known as National programme for control of blindness and visual impairment (NPCBVI)2017.

Age related macular degenerations are one of the leading causes of low vision, followed by some other eye diseases such as cataract as well as diabetic retinopathy. Due to the impairment in vision it has been observed that the elderly population has been facing loss of independence. Moreover, this has lead to increased number of secondary problems like feeling of depression which has been considered to be twice than the people with normal vision. They often feel isolated from the society which increases their social anxiety. Their need of assistance increases as they are unable to perform their activities on their own. In order to cope up with the stress, the elderly people are provided with counsellor who can personally visit them at their homes.

Different support groups can also be helpful for engaging the patients socially. Visual hallucinations are often experienced by by people having visual impairment. About one-fourth of the patients suffering from ARMD experiences this. It may last from less than a minute to about an hour. According to the studies conducted, diabetes is one of the severe health conditions which leads to loss of vision in the elderly group of patients.Elevation of blood glucose over a period of time, can lead to diabetic retinopathy. Therefore it is of utmost importance that they are counseled about the nutrition by the clinicians. Also they should monitor their blood pressure levels regularly and keep them in check to avoid the worsening of diabetic retinopathy and to prevent hypertensive retinopathy as well. Since the blood sugar level is fluctuating in case of diabetes patients, they should do routine eye checkups.

Glaucoma is an eye disorder in which there is an impairment of fluid inside the eye. This can lead

to optic nerve damage and can progress to blindness if left untreated. The loss of sight due to glaucoma cannot be improved even by the use of variety of treatments available, but can conserve the remaining vision.

### 3.2 Overview of Types of Vision Impairment

The International Classification of Diseases (ICD)11 (2018) Classifies Vision Impairment Into Two Groups- Distance and Near Presenting Vision Impairment

### 3.3 Distance Vision Impairment

1) MILD- visual acuity worse than 6/12 to 6/18
2) MODERATE- visual acuity worse than 6/18 to 6/60
3) SEVERE- visual acuity worse than 6/60 to 3/60
4) BLINDNESS- visual acuity worse than 3/60

### 3.4 Near Vision Impairment

Near visual acuity worse than N6 or M.08 AT 40cm [6].

### 3.5 About NPCBVI

- Launched in the year 1976.
- The goal was to reduce the prevalence of blindness from ~1.4 to 0.3%
- Was launched as a 100% centrally sponsored scheme.
- Blindness prevalence was about 1.1% as per a survey conducted in the year 2001-02.
- Prevalence further reduced to 1% by the year 2006-07 [7].

### 3.6 Goals and Objectives of NVBDCI

- Backlog reduction – one can achieve this by giving them prompt treatment at various levels i.e. primary, secondary, tertiary levels of health care sectors and by proper identification.
- Strengthening of the strategies – this can be achieved by preventing various visual impairments.
- Should provide quality service delivery in order to strengthen its strategy.
- Upgrade the RIO's – so that they become excellent centres at various sub-speciality level ofophthalmology
- Extensive research is to be done in order to prevent not only visual impairment but blindness too
- There should be increase in participation of even private ophthalmologists.
- Community awareness should be taken seriously in terms of eye care and various preventive measures which can be adopted by any person

### 3.7 The Importance of Eye Health

Various reviews were conducted so as to establish a relationship between eye health and SDG's. In other words it simply means that if we improve access to eye health services we can achieve many SDG's. this can be done by increasing work productivity, giving proper education and health and by reduction of poverty. if we believe that eye health improvement is a human development issue than achieving it is not a difficult task for us.By improving employment rates, household income, productivity in workplace, the sustainable development goals can be achieved. Gender equity should take place as it is observed that females have poorer access to health services.

Taking into consideration, the ongoing pandemic can also pose a big problem for the blind people [8-12]. It is not easy to follow all the protocols like social distancing I.e. the 6 feet rule, since blind person relies on his or her other senses to perform their day to day activities. The benefits that the blind people get from the rehabilitative services started by the government is also hampered due to the ongoing pandemic. Eye related problems like refractive errors, progression of retinopathy in diabetic patients and other disorders have increased since lockdown due to prolonged screen time and decreased exposure to natural light.

### 3.8 Visual Impairment Impact

1) Personal Impact- children can experience delayed motor, emotional, cognitive development if they have serious vision impairment in a very young age. Educational levels achieved by a child can also be affected if he/she had any vision impairment.

2) Now among the adult population, due to vision impairment, the quality of life is affected.
3) Now among the older population, what they experience is isolation from the society, they have difficulty in walking, increased number of fractures. And eventually such people have a greater likelihood of admitting themselves to nursing homes.
4) Economic Impact- Vision impairment is considered as a big financial burden. We should have enough finances in order to reduce the incidence.

## 4. CONCLUSION

To conclude, as we said above low vision can be a major obstacle in the lives of people living with it, causing an obstruction in their day to day activities. And a peak rise has been witnessed regarding this problem in the past few years, therefore making it an important issue which needs to be dealt with utmost attention. But what makes it such an important issue is that, vision may decrease further, ultimately causing blindness in a person.

To tackle this problem, many low vision aids have been invented which are different for each age group but are many issues related to this.

There are many factors which need one's attention regarding this problem, one of them is the cost at which they are available as everyone cannot afford them at such high prices so an initiative should be taken by the government of our country to provide enough resources and funding in this area. Not being able to perform daily activities makes a person with disturbance in vision, dependable on others and somewhat affects their quality of life as well as their mental health. Some measures have been taken for the rehabilitation of people living with low vision, which helps them in performing any task with an ease.

Even though we are currently living in the 21$^{st}$ century, management regarding low vision in India is not up to the point as compared to the developed countries.

As we mentioned above, there have been many advancements in the field of ophthalmology with respect to various healthcare interventions for people living with disturbances in vision. To name a few, these interventions include- navigation aids to assess in the transportation, retinal prosthesis which is implanted surgically in a person who is blind, head-borne electronic glasses which provides them with better magnification and contrast of the objects.

Since we say that we can prevent a large number of cases but technically we cannot achieve it on a larger scale, it is not possible. As we know every eye condition requires a different approach for its treatment. We can achieve this by using effective interventions in order to promote, prevent, treat various eye conditions. Cost-effectiveness and easy feasibility of such interventions are easy to implement. Specific treatment is required for specific conditions of the eye. For example, refractive errors should be corrected by spectacle use or surgery if needed. Treatment nowadays, is also available for some conditions even if they do not require any treatment, in such cases we provide them with prompt treatment so that the existing conditions does not progress to any severe disease. There are some evidences that electronic devices provide better improvement than optical devices for the users to read something. Future researches should focus on one thing that is sustained and long use of each and every eye device. Future researches should also include the efficacy of every device in terms of it accuracy and much more so as to benefit in a child's development. Since medical and surgical interventions are not so useful among the patients suffering from age related macular degenerations, the use of low vision aids is proven to be useful in the correction of vision. Therefore to conclude, low vision is a condition that needs cooperation and adaptation. Patients have to be managed and advised to undergo regular checkups and counseled from time to time. A safe home environment can help to ensure, that the patient does not go into depression and feel socially neglected.

## CONSENT

It is not applicable.

## ETHICAL APPROVAL

It is not applicable.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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