Clinical Practice

Low vision devices

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Abstract

A person with low vision has some useful sight. However, low vision usually interferes with the performance of daily activities such as reading or driving. Because low vision cannot be improved by mere traditional methods (i.e., the use of eyeglasses, contact lenses, etc), persons with low vision often rely on the use of a number of different instruments, called low vision devices, and tailored equipment for improved vision. Low vision devices are described in this article.

Introduction

Low vision is a condition that involves a minimal ability to see (particularly central vision) which is usually 6/ 18 or worse that is unresolved or uncorrected with traditional eyeglasses, contact lens, intraocular lens implants or corrective surgery. Low vision is not the same as blindness. Unlike a person who is blind, a person with low vision has some useful sight. However, low vision usually interferes with the performance of daily activities such as reading or driving (Liz S, 2008). A person with low vision may not recognize images at a distance or be able to differentiate colors of similar tones.

According to WHO statistics (Resnokoff et al, 2004), there are about 45 million blind and 135 million low-vision individuals, together comprising a total of 180 million visually- impaired people all over the world. A majority (90 %) of these individuals live in the least developed countries. Of the 180 million visually-impaired persons worldwide, 1.5 million are children (0-15 years) who are blind and approximately 5 million children have low vision. There are about 580 million people over the age of 60 years worldwide, of which 355 million live in developing countries like India. WHO estimates reveal that the prevalence of blindness in people aged greater than 60 years in developing countries is 88 % compared to 11.2 % in the developed world.

Although low vision can occur at any stage in life, it primarily affects the elderly. However, low vision is not a natural part of aging. Although most people experience some physiological changes with age (presbyopia), these changes usually do not lead to low-vision. Most people develop low vision because of eye diseases. The common causes of low vision and blindness in the young are retinitis pigmentosa, hereditary macular degeneration, cataract, optic atrophy and glaucoma. Diabetic retinopathy, glaucoma and age-related macular degeneration account for 70 % of the global burden of blindness in the elderly age group. Although, in most cases, persons with low vision have disabled central vision (also called reading vision), there are other types of low vision which may include disabled or partial peripheral vision, disabled or partial color vision, disabled or partial ability to adjust to different light settings and disabled or partial ability to adjust to different contrasts and glared vision. When vision impairment is recognized early, treatment can be more effective, enabling people to maintain as much independence as possible.

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Because low vision cannot be improved by mere traditional methods (i.e., the use of eye glasses, contact lenses, etc), persons with low vision often rely on the use of a number of different instruments, called low vision devices, and tailored equipment for improved vision. Low vision devices, categorized as either optical or non-optical, help to improve visual ability for millions of people everyday.

Optical devices

Simply stated, optical low-vision devices involve the use of one of many types of lenses to improve vision e.g. magnifying devices (i.e., magnifying eye glasses, hand magnifiers, magnifying lamps, telescopic viewing devices, etc.), closed circuit television, or CCTV (involves enlarged images, exaggerated contrasts and adjustable magnification).

Optical devices for distance vision tasks: telescopes

Distance-vision telescopes are the only optical devices that assist low-vision patients with distance tasks when conventional glasses are unsuccessful. Telescopes improve the resolution of objects by enlarging the image, thus bringing the object closer, i.e. angular magnification. Telescopic lenses are not preferred due to cosmetic reasons and because of restricted field of view.

Spectacle magnifiers

These are monocular or binocular convex reading lenses mounted in a standard full diameter or half eye frame. The convex lens functions to enlarge the images on to the retina. The powers range up to + 24 D. They are used for long term reading, writing, needlework, etc. The disadvantage is a requirement of close working distance which may obstruct the illumination and make writing difficult if the lens is stronger than + 10 D.

Fig 1 Spectacle magnifier adult size

Fig 2 Magnified View of fig 1

Fig 3 Spectacle Magnifier Half eyed with Base in Prism

Fig 4 Spectacle magnifier child size

Fig 5 Spectacle mounted Telescopic Lenses for Near

fig 6 Spectacle mounted Telescopic Lenses for Distance

Magnifiers

These could be either hand-held or stand magnifiers and are designed to help low-vision patients with short-term spotting tasks like reading a newspaper or a book, checking the mail, phone numbers and addresses. Hand-held magnifiers range from +10 to +24 D. These are cheap and readily available, portable and foldable. The disadvantages are a reduced field of view, the need to be held with the hands and a less acceptability than glasses. Stand magnifiers are convex lenses with a fixed focus stand. They are good for reading purposes especially in old patients with tremors. But they are inconvenient to carry around and have a limited field of view.

Fig 7 MonocularTelescopic lenses for Distance

Fig 8 Foldable(Pocket) Hand held Magnifier

Fig 9 Foldable(Pocket) Hand held Magnifier

Fig 10 Foldable(Pocket) Hand held Magnifier

Fig 11 Hand held magnifier

Fig 12 Hand held magnifier

Fig 13 Stand Magnifier

Fig 14 Stand Magnifier

Glare control devices

Glare is distracting scattered light which can be controlled with devices such as absorptive lenses, tints and ultraviolet and antireflective coatings.

Fig 15 Tinted Lenses for Glare Control

Non-optical low-vision devices

They help bring images closer to the eyes and may include the use of larger print items (i.e., magazines, newspapers, books, calendars, address books, cookbooks, dictionaries, games, playing cards, sheet music, street signs, etc.), larger and illuminated watches and clocks, writing guides and instruments that provide voice instruction (i.e., computers) and instruments that provide voice information (i.e., clocks, timers, calculators, scales, key chains, etc).

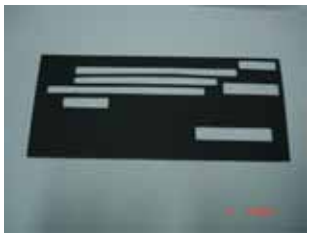

Fig 16 Check Guide

Fig 17 Bold Line Paper

Fig 18 Colour identifier

Writing guide

This is very useful for writing on any paper.

Fig 19 Writing Guide

Fig 21 Reading Guide

Signature guide

This is a rectangular black card with a rectangular cut-out in the middle of the card. This can be a very useful tool for signing on any paper.

Fig 22 Signature Guide

Notex

Currency note is placed behind the notex which has seven serrated edges on one side. The first cut indicates Rs 500, second Rs 100, third Rs 50, fourth Rs 10, fifth Rs 5, sixth Rs 2 and the seventh Re 1.

Fig 20 Notex

Conclusion

With the availability of a wide range of low-vision devices, people with low vision also can enjoy a near normal life with active vision.

References

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Source of support: nil. Conflict of interest: none