Review Article

Causes and Management of Low Vision in Geriatric Population- A Literature Review

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Abstract

Age-related low vision has become a common challenge for developing and developed countries. Several extensive, population-based cross-sectional studies have documented an increase in eye disease prevalence and visual impairment with increasing age, particularly in persons over 75 years of age. The Centers for Disease Control Prevention (CDC) and the National Centers for Health Statistics (NCHS) estimate the frequency of major visual disorders affects over 50 million people worldwide. And two-third of the people are from the Asian region. Most of the people after 85 are suffering from vision impairment and they are unable to do simple daily work like reading, writing, and driving. For this, they do need rehabilitation training.

Keywords: visual impairment, elderly, low vision aids, visual rehabilitation, visual acuity, dark adaptation, color vision.

Introduction

Every older person experiences age-related vision changes. The age-related transitions that are for older adults trigger mental issues. Decreased ocular media reception, enhanced corneal scattering, the lens, the vitreous body, the retina, and the pupil's reduced size are attributed to physiological changes in the aged eye. Age-related impairment is not only challenging for the person who develops it, but also for the whole society. Vision loss has caused enough for the deterioration in the function of older people. However, visual deficiency has also been linked with visual deprivation with cognitive impairment, heart failure, asthma, stroke, fall and hip injury, depression, diminished performance. The study of the low vision in the Geriatric population focuses on the regular age-related vision changes, care for the older adult who lost their vision, and assurance about the maintenance.

Objectives

- Understand the prevalence of visual disability in older people, its practical consequences, and the tangible and intangible cost of vision impairment to the elderly adult who experiences it, the family, and culture.
- Understand typical age-related vision changes and the most prominent clinical indicators and eye conditions linked to age.
- Treatment for older people with vision loss, guidelines, supportive counseling, and sufficient references to eye care and rehabilitation providers.
- Ensure that older people with low vision in long-term and palliative care have their unique visual needs addressed.

Related Disease

The Loss of vision is the cause of the loss of control in older people, but eye loss has also been correlated with eye deprivation.With cognitive impairment, there are high chances of suffering from heart disease, asthma, slip and hip injury, depression, diminished clinical output. Older visually disabled individuals are twice as likely to have trouble walking as sighted peers do.Three times as likely to have trouble getting out, more than half as likely to have difficulties getting in and out of bed.In most cases, vision loss in the geriatric population is caused by other diseases like diabetes, cataract, and glaucoma. In most of the issues, the visual impairments that do not undergo the treatment have one or two additional impairments. Other impairments are heart disease, loss of hearing, movement impair-ment, and cognitive changes arising from stroke or coma. Lack of quality of life and financial pressures due to vision disability and blindness are beginning to escalate significantly as people reach the age of 40. The primary causes of age-related vision loss can be attributed to changes in the lens's shape and operation, one of the tissues responsible for concentrating the light on the retina. Age-related nuclear cataracts, caused by the accumulation and condensation of proteins, limit vision because they hinder light delivery and concentration. [5,7]

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The change of Vision in the Geriatric Population

Decreased ocular media receptionincreased light scatter in the cornea, the lens, the vitreous body, the retina, and the pupil's reduced size are attributed to physiological changes in the aged eye.The age-related problems discussed here have the most significant effect on the function of everyday life. The vision changes should be considered with contemplating daily living, quality of life and architecture, and all kinds of Facilities to the Geriatric people.In the year 2013, a total number of 300 subjects participated in research in Pondicherry of India, with a response rate of 94.3 percent. The majority (64 percent, 192) were in the 60-69 years age range. Around 39.7% (119) of them were males. About 2/3 of them, 63.7 percent (191), stayed with their wife, and 39.3 percent (118) did not attend education. With regards to morbidity, 42.3 percent (127) were hypertensive, 35.3 percent (106) had musculoskeletal conditions, 30.7percent (92) had reduced vision, 25.3 per cent (76) had diabetes, 15.3 per cent (46) had a hearing disability, and 6 per cent (18) had ADL disabled.[6]

Loss of Accommodation

The ability to manage distance-to-near concentration on visual objectives, which depends on the flexible crystalline lens and ciliary muscle, is altered with age, starting at around the middle age. During this age transition, it is necessary to increase the amount of plus in a concave lens (reading glasses) to improve the eye's focusing capacity to cover the loss of the lens' refracting ability for close vision.

Unable to identify the color

Another facet of vision that decreases with advancing age is to identify the color. It is difficult for Geriatric people to discern variations between different types of dark colors and difficulties with pastels. In old age, color vision loss is attributed to smaller pupil diameter, decreased light transmission through the lens and variations in neuronal pathways and photoreceptors.

Facing challenges to adapting dark

As a result of loss of ocular transmission and pupil miosis due to aging, dark adaptation declines, a commonly sighted older person may function as if he or she is severely visually impaired.

Acuity loss in Geriatric people

Under high-contrast, the visual acuity of normal sighted older people shows just a slight decline. However, on reduction in an acuity chart's illumination or a decrease of the acuity chart's contrast, the ambient glare causes drastic age-related acuity losses in geriatric age group.The research has been done on some senior people from Hyderabad, India. The data has been collected from the 41 homes of the Geriatric people through eye testing. Interviews were performed to gather personal and demographic knowledge, societal health status and fear of falling, stress, and falls pattern in the last year. VI categories included poor vision (displaying visual acuity worse than 6/18 to 3/60) and blindness (showing visual acuity worse than 3/60). The data of 1,074 participants were analyzed. [1]

Issue of Sensitivity towards glare in Geriatric people

Due to anatomical changes in the eyes and the media, older people are more sensitive to glare, are more likely to encounter disabling glare. Due to glare, visual distress may occur, and disabling glare may cover key targets that must be for the sake of protection.

Loss of the visual field of focus

Loss of focusing the visual field, the region of the visible area over which rapid presentation can be processed, visual knowledge declines with age.

Facing challenges in reading

Visual reading ability declines in senior people. The reading rate of older individuals who are usually sighted and possess strong visual acuity in high contrast drops by as much as a third of that of young readers. But the proper training can emphasize changes in eye movements similar to those used to promote reading for school kids, producing good results for this Geriatric people. However, such preparation is not commonly available.

Age-related visual disability commonly found in Geriatric people

Macular Degeneration Related to Age

For the Macular Degeneration, senior people are facing challenges regarding visual acuity. The Geriatric people face challenges for recognizing a face, identifying the color, contrast, and measurements.

Because of their age, they develop a retinal locus or loci (PRL). And in many cases, they are unaware of the development. For this reason, they are facing lots of difficulties in real life. [10]

Diabetic retinopathy

Clinically at this age, a person will face difficulties with reduced visual acuity, scattered central scotomas, and macular edema also. And in regular life, Geriatric people face problems in reading, perception of color, and, last but not least, unable to move because of the loss of the measurement ability. Diabetic retinopathy can produce permanent visual impairment. But it can be controlled if it is treated at an appropriate time.

Cataract

The lens's gradual opacity, which interferes with light passing, is manifested by age-related cataract, reduced visual acuity, light dispersion, glare sensitivity, distorted color vision, and image disorder.

Glaucoma

Glaucoma is a rise in intraocular pressure due to an irregular flow of aqueous fluid from the atmosphere with an anterior chamber. It may result in optic disc degeneration, visual field loss, and extreme visual impairment.

Roles and Responsibilities of Geriatrician

The geriatrician may play an essential role in the diagnosis and medical treatment of the patient's vision loss after ensuring that visually disabled individuals receive high-quality recovery care promptly and have all the advantages from which the patients can derive.

A geriatrician can offer the following services to their patients related to vision recovery.

1. After evaluating the visual acuity of the patient, they can prepare a record.
2. They can use a Pelli-Robson chart for the contrast sensitivity patient.

3. A geriatrician can refer the patient to vision rehabilitation professionals to train them to lead a normal life with therapists' help.
4. Counseling them for their psychological change related to visual impairment.
5. They can incorporate a simple strategy to improve senior people's performance.
6. Making aware to the patient, the patient's family, and the whole community about low vision inabilities by giving accurate information.

Clinical and functional assessment for the Geriatric people

Assess the case history

This knowledge can be used for a pre-examination telephone interview to shorten the duration of the first interview. A visit to doctor for examination can be required since low-vision recovery requires a great deal of patience and inspiration. Because low vision rehabilitation requires lots of energy and motivation from patient's side, it will be guided by their personal goals for rehabilitation and by those tasks that are difficult or impossible to perform due to reduced vision. For this, the examiner might find that some kind of education is appropriate to set realistic objectives for low-vision care. Because most of low vision interventions and assistive devices are "task specific", it is important to state treatment goals as specifically as possible.

Clinical Assessment

The assessment should be observed in the traditional method, including distance and near acuity; internal and external ocular health examination; retinoscopy; tonometry and slit-lamp biomicroscopy; ophthalmo-scopy; central and distant fields; color vision and contrast-sensitivity testing; glare testing; and near and distance testing; vision-enhancing products, including visual, electronic and non-optical systems.

Providing Long term care to the Geriatric people

It is vital to provide long term care to the Geriatric people by making aware of health care workers about vision impairment. Another important one is to give useful information to the family so that older people can get support from them. And the functional assessment should be done by the caregivers by examining the daily performance of senior people.

Management of Low Vision-Developing a vision Rehabilitation plan

The clinical and functional low vision assessment culminates in some rehabilitation plan, which sums up the assessment information in precisely documented objectives and goals. This type of program also emphasizes a process using the principle of andragogy, which incorporates the aged person's beliefs and life experience. The low-vision team suggests devices including optical, non-optical, and environmental modifications based on the assessment result. The research founds that specific therapy, along with low vision devices, improves the patient's condition to some extent compared to services provided by eye care specialists. [9]

Low Vision Therapy

The therapy includes the following:

1. Training like fixation, visual scanning for other visual tasks such as locating a traffic light or street sign, and preferred retinal locus ability for reading
2. Training to improve reading accuracy, speed.
3. Use of low-vision devices for daily tasks like writing, reading, etc.
4. Use of technologies such as computers, smart phones, tablets, global positioning devices
5. Guidance on safe, functional movement within the known environment.
6. ADLs such as maintenance of home, cooking, washing, grooming.
7. Self-care of health like blood pressure check, diabetes management, ostomy care
8. Usage of community resources for visually disabled persons, such as support groups, free programs such as the Blind Talking Book Library, the Treasury Department's free money tracker, low or no cost transport, etc.

Instruction and practice using low-vision devices

Family members can provide the necessary support while knowing the process as well. Tools can also be borrowed in daily activities to ensure they are useful before prescribed. Some of the side effects of using magnification are – Nausea, dizziness, and motion sickness, which can be reduced with the help of instruction. Binocular and monocular should be used as spotting devices only andolder adult must never attempt to walk while looking through them. Another aspect to be explored is presence of hand tremors in elderly as they can be so severe that handheld magnifiers and telescopes may prove useless and in such cases spectacle mounted low vision aids may prove useful. The ergonomic aspect also needs to be taken care of to avoid back and neck pain. The low-vision therapist should describe these sorts of ergonomic devices like footstool, lamps and reading stands, etc.

Low-vision devices

A typical example of low-vision devices is ergonomic, optical, electrical devices, smartphones, tablets, etc. Post clinical and functional assessment, the low-vision team will comment on whether magnification, mini-fication,voice-over devices can be used to improve vision. Following are of low-vision and speech-output device:

1. Optical /electronic device:
2. Stand or handheld magnifiers
3. Closed-circuit television system
4. Handheld monoculars or binoculars
5. Non-optical Devices:Large print books, reading stands, lamps,Handwriting implements

Instruction for the devices which improve remaining vision

A series of instructional procedures covers several areas:

1. Visual skills without low-vision devices
2. Graphic skills with low-vision devices
3. Use of vision and low-vision devices for individualized functional tasks that lead to the accomplishment of defined goals

Instructions in the use of visual skills without devices covers fixation, spotting, localization, scanning, tracing and tracking.Instructions in the use of visual skills with low

vision devices includes maintain of focal distance, adjustment of eye and head movements to compensate for restricted field of view through the lens.

Writing and Reading with Low -vision devices

Reading is a common habit of elders. In using the PRL for reading, the reader can require instruction and practice, especially because of using magnification to compensate for the loss of visual acuity. Using various magnification devices, lighting devices, stencils (control models, envelopes, letters, etc. that ensure that writing is spatially correct), and pens that provide more clarity, older adults with poor vision can efficiently write. For most low-view devices, older adults with strong computer skills may replace desktop computers, laptops, or smartphones and use widely built magnification, voice-over, and both to achieve reading and writing objectives.

Required Environment for aged people

It is vital that older adults are directed towards familiar and unfamiliar environments and that the atmosphere is as "user-friendly" as possible to enhance independence and protection. Several rehabilitation methods help to achieve this task. Improve lighting, Increase contrast between objects and background, Use bright, clear colors are few ways to improve the environment.

Improving the lighting

Many older individuals need two to three times more light for the same tasks than younger individuals. In that setting, an older person with low vision can be blind and unable to find a chair, remember his mates, serve his plate, or identify the food in a buffet line. Since the light intensity is inversely proportional to the square's distance from its source, adding light at ceiling height will not provide older viewers with sufficient task lighting. Task lighting that can be put closer to reading/writing material or craft activity would be needed for many older people with low vision.

The below types of bulbs are useful:

1. Fluorescent lighting
2. Incandescent light
3. Halogen light
4. Neodymium oxide and incandescent bulbs

Increasing Contrast

Providing a dark background area and a light background area in the bathroom, kitchen, and bedroom can also help distinguish belongings more easily.

Using Color

Use bright clear colors for marking switches, dials etc.as some visual impairment also decrease color vision, especially those affecting the cones, such as macular degeneration.

Practicing Organizational Strategies

Organizations can be extremely helpful for the persons with low vision. For example, always making sure that doors are completely open or completely closed, and placing chairs under the table when not in use increases the safety of the environment. Color coding and labeling for clothes in closets and drawers and organizing the kitchen can enable an elderly to continue living independently. Learning new ways of performing daily tasks can make the loss of vision less of a problem in independent living. For example, retrieving a pair of spectacles that have fallen onto a carpet might be difficult for some elderly. Learning a visual scanning pattern that starts at the location where the spectacles appear to have dropped and then proceed outward in a circular way until they are located will assist in retrieving them. Using color coding can be helpful as well. For instance, large yellow rubber bands could be marked on chicken soup cans, and tomato soup cans could be marked with broad red rubber bands. These markers could be easily identified avoiding the necessity of magnifier each time soup needs to be retrieved.

Using Alternative Strategies

Particularly if an older low vision adult maintains a usable vision for a wide range of tasks, using alternate methods that may not involve the image is also beneficial because a picture may not be the most powerful or safest way to perform those tasks. Awareness of a wide range of rehabilitation methods and resources may help low-vision older adults build various techniques and devices that enable them to perform tasks safely, effectively, and efficiently.

Few Techniques are as below:

1. Using a starting/ending point
2. Using compass directions or clock face
3. Using landmarks and cues

Psychosocial considerations

Adaptation to Vision Loss

Others subscribe to the theory that depression and anxiety are related to the negative stereotypes of a person about vision problems and a lack of trust and motivation to try rehabilitation. Still, that anxiety and depression should be reduced if repair to be effective. Older adults may hold many negative stereotypes associated with visual impairment: increased helplessness, inhabiting a world of darkness, increased vulnerability to crime, the perception that devices mark them as distinct or pitiful. [4]

Family and Social Support

Assisting older adults with low vision in ongoing social events, such as hobbies, crafts, sports, and travel, will help them retain substantial family and peer connections. It is advised to promote assertiveness for older adults with low vision because it is related to lessen depression and more social support. For older adults who may be overprotected, manipulated, or viewed paternalistically by others who do not recognize visual impairment or aging, peer support or mutual aid groups who frequently meet to discuss their concerns may be particularly helpful. Knowing your older adult's actions with low vision is easier for family members who understand the practical ramifications of visual impairment.

Funding for low-vision rehabilitation

Rehabilitation Services Administration

Vision recovery services have been supportive for people preparing for the workforce through private payment or vocational rehabilitation services. A critical health care challenge has been the funding of support for older adults with vision deficiency. State Governments can also assign allowance to obtain vision and blind rehabilitation for low-income older adults as well. The general treatment of a patient with AMD must include therapy, prescribing suitable LVDs, and preparing to make the most of residual vision. This is intended to improve the quality of life of a patient. [11]

Veterans Health Administration

Many visually disabled veterans have vision loss associated with age, and their income is such that they or their private insurance carrier request a copayment. There were few other medical issues for young war-blinded men, so attempts to rehabilitate them for the workforce produced orientation careers to address their particular needs, mobility teachers, rehabilitation educators for the blind and low-vision therapists. The increase in low-vision older adults has prompted Medicare to establish a national policy of reimburse-ment as well.

Palliative care

Palliative care for visually impaired older adults can focus on ensuring that patients can see and participate in activities; continue hobbies and other preferred activities that alleviate stress and make them feel that life is normal; participate in diversions that can help manage pain; participate in spiritual activities such as reading or listening to devotional materials that improve faith and minimize depression and anxiety. [2]

Few significant considerations in this aspect

1. Ensure the eyeglasses are up-to-date for spectacle correction. Ensure that spectacles, magnifiers, and other valuable tools are within reach of the patient and are stored in the same known location so that they can be used whenever needed.
2. Assure that the autonomy of the patient is preserved in long-term care
3. Place the phone, call bell, and bedside table in a known position within the patient's reach.
4. Craft operations and games that are expanded and use bright saturated colors and high contrast are available.
5. To explain the location of food on the plate and all things on your food tray, use clock coordinates.
6. Encourage the patient to use assistive devices, such as clocks/watches, radios, talking clocks.
7. Encourage the patient to use reading technology for reading enjoyment, devotional events, etc.
8. Using the "Human Guide" technique to assist the patient with ambulating if the patient is mobile

Conclusion

Visual impairment in older adults can be treated through evaluation, prescription and referral of assistive devices and therapies, rehabilitation training along with education of family and other health professionals. Depression, comorbid health conditions, and other disorders are associated with vision loss in older adults. Vision loss care and recovery promote independence and mental wellbeing. Geriatricians will play an important role in ensuring the recovery of older adults with poor vision and promoting the full spectrum of resources that can be offered. Addressing visual disability and ensuring that older people maintain their graphic skills and abilities included as a part of long-term and palliative care programs. This research reveals that vision disability is a significant health problem that is unevenly spread across WHO regions; preventable factors are as large as 80% of the overall global burden.[8]

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References

1. Marmamula S, Barrenkala NR, Challa R, Kumbham TR, Modepalli SB, Yellapragada R, Bhakki M, Friedman DS, Khanna RC. falls and visual impairment among elderly residents in 'homes for the aged'inindia. Scientific reports. 2020 ;10(1):1-8.
2. Watson M. Oxford handbook of palliative care. Oxford University Press, USA; 2019 Jul 12.
3. Laliberte Rudman D, Egan MY, McGrath CE, Kessler D, Gardner P, King J, Ceci C. Low vision rehabilitation, age-related vision loss, and risk: a critical interpretive synthesis. The Gerontologist. 2016 ;56(3):e32-45.
4. Nollett CL, Bray N, Bunce C, Casten RJ, Edwards RT, Hegel MT, Janikoun S, Jumbe SE, Ryan B, Shearn J, Smith DJ. Depression in Visual Impairment Trial (DEPVIT): a randomized clinical trial of depression treatments in people with low vision. Investigative ophthalmology & visual science. 2016;57(10):4247-54.
5. Lim YE, Vukicevic M, Koklanis K, Boyle J. Low vision services in the Asia-Pacific region: models of low vision service delivery and barriers to access. Journal of Visual Impairment & Blindness. 2014 ;108(4):311-22.
6. Ganesh Kumar S, Majumdar A, Pavithra G. Quality of life (QOL) and its associated factors using WHOQOL-BREF among elderly in urban Puducherry, India. Journal of clinical and diagnostic research: JCDR. 2014 ;8(1):54.
7. Petrash JM. Aging and age-related diseases of the ocular lens and vitreous body. Investigative ophthalmology & visual science. 2013;54(14):ORSF54-9.
8. Pascolini D, Mariotti SP. Global estimates of visual impairment: 2010. British Journal of Ophthalmology. 2012;96(5):614-8.
9. Kempen GI, Ballemans J, Ranchor AV, van Rens GH, Zijlstra GR. The impact of low vision on activities of daily living, symptoms of depression, feelings of anxiety and social support in community-living older adults seeking vision rehabilitation services. Quality of life research. 2012 ;21(8):1405-11.
10. Eichenbaum JW. Geriatric vision loss due to cataracts, macular degeneration, and glaucoma. Mount Sinai Journal of Medicine: A Journal of Translational and Personalized Medicine. 2012;79(2):276-94.
11. Khan SA, Das T, Kumar SM, Nutheti R. Low vision rehabilitation in patients with age-related macular degeneration at a tertiary eye care centre in southern India. Clinical & Experimental Ophthalmology. 2002 ;30(6):404-10.