Reading performance with low vision aids

Essay

Submitted in the partial fulfillment of

M.Sc. degree in ophthalmology

By

Radwa Fayez Dawood Radwan

M.B., B.Ch

Supervised by

Professor Dr. Beshr Atef Kenawy

Professor of Ophthalmology

Faculty of Medicine

Cairo University

Professor Dr. Mai Helmi Mohamed El Sharawy

Professor of Ophthalmology

Faculty of Medicine

Cairo University

Faculty of Medicine

Cairo University

2011

Abstract

The visual impairment tends to exacerbate the behavioral disorder by impeding visual attention, interaction with objects and persons. This study depends on diagnosis of low vision and different causes of low vision. It includes methods to assess low vision patients. These methods involve description of optical, non optical low vision aids and the role of intra ocular surgeries in improving vision. Some patients can not benefit of these aids. So vision rehabilitation services can produce different methods to help these patients functionally and to adapt their life. Rehabilitation is more effective for visually impaired patients suffering from an extra burden, called depression.

***Key words*:**

Low vision, Optical low vision aids, Non optical low vision aids

Rehabilitation, Vision rehabilitation services.

Acknowledgments

First of all, I would like to express my deepest gratitude to ***"Allah"*** the most Merciful who is praised for all his favors and blessings.

I would like to thank Prof. Dr. ***Beshr Atef Kenawy***, Prof. of ophthalmology, Cairo University, for his great help and support. It is a great honor to work under his supervision.

No words could express my sincere feeling of gratitude and respect to Prof. Dr. ***Mai Helmi Mohamed El Sharawy***, Prof. of ophthalmology, Cairo University For her endless support and encouragement in initiating and completing the present work. She offered me much of her time and experience. I am truly indebted to her for her unlimited support throughout the whole work.

Also I would like to thank ***my father and my husband*** who stood by me through all this work, encouraged me and prayed for me. I also thank all my family and my colleagues for their support and prayers.

Table of contents

Subject *page*

- *Abstract.*
- *Acknowledgment.*
- *List of abbreviations.*
- *List of tables.*
- *List of figures.*
- *Introduction and aim of work.* *1*
- *Chapter I: Definition of low vision.* *3*
- *Chapter II: Causes of low vision.* *13*
- *Chapter III: Examination of low vision.* *20*
- *Chapter IV: Determining and magnification of low vision.* *39*
- *Chapter V: Treatment of low vision with different aids.* *47*
- *Chapter VI: Some products for low vision aids and rehabilitation of patient with low vision.* *68*
- *Summary.* *81*
- *References.* *84*
- *Arabic summary.* *93*

List of abbreviations

ARMD : Age- Related Macular Degeneration.

CCTV : Closed Circuit Television.

CNV : Choroidal neovascularizttion.

CSF : Contrast Sensitivity Function.

EV : Eccenting Viewing.

IMT : Implantable Miniature Telescope.

ICD : International Statistical Classification of Diseases.

Log MAR : Logarithm of the minimum angle of resolution.

LVAs : Low Vision Aids.

PRL : Preferred Retinal Location.

RPE : Retinal Pigment Epithelium.

SES : Steady Eye Strategy.

VRD : Virtual Retinal Displays.

WHO : World Health Organization.

List of Tables

Table (1):

- Classification of visual impairment in a person according to International Classification of Diseases. (Page 6)

Table (2):

- Categories of severity of visual impairment according to the International Statistical Classification of Diseases. (page 10)

Table (3):

- Recommendation for the categories of severity of visual impairment in the Inter National Classification of Diseases. (Page 11)

Table (4):

- ICD-9-CM Definitions of low vision and blindness. (Page 22)

Table (5):

- Visual acuity loss and loss of reading ability. (Page 26)

Table (6):

- National Research Council (2002) Visual Impairment. Washington DC: National Academy Press. (Page 33)

Table (7):

- Relative Distance Magnification based on Normal Reading Distance. (Page 50)

Table (8):

- Advantages and disadvantages between low vision aids. (Page 56)

Table (9):

- Samples of current Low Vision Aids. (Page 60)

List of Figures

Figure number	Page number
Figure (1): Age Related Macular Degeneration	15
Figure (2): Normal macula. Funds photograph demonstrates normal optic disc, retinal vessels and macula.	17
Figure (3): Age-related macular degeneration.fundus photograph of 68-years-old man with numerous drusen and pigmentary alteration. Despite the drusen, the patient was asymptomatic with 20/20 vision.	17
Figure (4): Age –related macular degeneration. Funds photograph of 74-yearsold man with geographic atrophy. Several patches of atrophy are apparent on the retina, retinal pigment epithelium and choroid around the centre of the macula. The patient complained of difficulty reading as a result of central and paracentral scotoma.	17
Figure (5): Diabetic retinopathy	18
Figure(6): Bailey- Lovie Log mar acuity chart	30
Figure(7): Feinbloom chart	30
Figure (8): Bailey- Lovie word reading chart.	31
Figure (9): Folding type-spectacle magnifier	54
Figure (10): Illuminated type- handheld magnifier	54
Figure (11): Handheld microscope	54
Figure (12): Hand frees- handheld magnifier	54
Figure (13): Head bands type- handheld magnifier	54
Figure (14): Round reading type- handheld magnifier	54
Figure (15): Reading with bifocal segment- handheld magnifier	54
Figure (16): Stand magnifiers	55
Figure (17): Telescopes	57
Figure (18): Closed circuit televisions	58
Figure (19): Ila “CAN- DO”- CCTV’S	58
Figure (20): Enhanced Vision System Cameras	58
Figure (21): Handheld Cameras	58
Figure (22): Innoventions Magnification Cameras	58
Figure (23): Portable systems	58

Figure (24): GW Micro	58
Figure (25): Optelec	59
Figure (26): VTI	59
Figure (27): Ash Technology	59
Figure (28): Bierley Associates	59
Figure (29): Telesensory CCTV'S	59
Figure(30): Clarity CCTV'S	59
Figure(31): Magnisight	59
Figure (32): Guerilla Technologies	59
Figure (33): Clock diagram of VRD process is accomplished	62
Figure (34): Conventional Display top- VRD	63
Figure (35): Portable VRD	64
Figure (36):Lighthouse near acuity chart	65
Figure(37): Prism half reading glasses	65
Figure (38):Micrascope aid used monocularly at closed working	65
Figure (39): Stand magnifier useful for patient with poor dexterity	66
Figure (40): Closed Circuit Television provides greater reading facility, while maintain large field of view	66
Figure (41): Full eye view	66
Figure (42): Undilated view of implantable miniature telescope	67
Figure (43): Dilated view of implantable miniature telescope	67
Figure(44): Low vision lightening	69
Figure (45): Large print books	69
Figure (46): vision phone	70
Figure (47): Computer screen magnifiers	70
Figure(48): Low vision aids for writing	70
Figure (49): Low vision clock	71
Figure(50): Silver Men's Talking Watch White Face	71
Figure (51): Large print wall	71
Figure(52): Out Light with Bookstand lamp	72
Figure(53): Large Number Wall Hanging Flip Clock/Calendar by Linear	72
Figure (54): Verilux Rechargeable Travel Lamp	72
Figure (55):Talking calculator	73
Figure (56):Low vision calculator	73
Figure (57):Scientific calculator	73

Figure (58):Address books	74
Figure (59): Appointment Books	74
Figure (60): Check and Money Management	74
Figure (61): Check Writing Guides	74
Figure(62): Envelope Writing Guides	74
Figure (63): Signature Guides	74
Figure (64): Coin abacus	75
Figure (65): Coin Abacus Worksheets	75
Figure (66): Time Timer Audible 6 inch timer	75

Contract

Doctors who shared in this subject,

Professor. Dr. Beshr Atef Kenawy,

Professor. Dr. Mai Helmi Mohamed El Sharawy

and *Dr. Radwa Radwan*

Have no interest in any product present in the subject.

They are not promoting for selling any product present in this subject.

Introduction and the aim of the work

Low vision is level of vision that is 20/70 or worse and cannot be fully corrected with conventional glasses (WHO, 1997).

Low vision interferes with normal functioning and causes a number of difficulties with reading, writing, watching TV, orientation, mobility and many activities of daily life.

Low vision is caused by number of diseases which can be classified according to age, but the most important causes are age- related macular degeneration (ARMD), diabetic retinopathy, glaucoma, cataract, optic nerve atrophy and corneal opacities (Klaver CC et al, 1998).

Patients with low vision should undergo certain investigations. These investigations include visual acuity tests for near and far, visual field examination, contrast sensitivity, ocular motility and assessment of macular function to assess the degree of handicap.

Low vision aids (LVAs) are classified into optical and non optical. Optical low vision aids are devices providing magnification to overcome reduced visual acuity, whereas contrast is maximized with local task lightening. Optical LVAs are hand magnifiers, high powered spectacle lenses, telescopic lenses, contact lenses. Also there are new optical methods like Closed Circuit Television (CCTV), head mounted display, Optical Prosthetic Device and finally Virtual Retinal Displays (VRD). Non optical aids can allow patient to do every daily life such as reading, writing, baking, and watching movies. There are many products such as lights, bold print books, and contrasting colored.

Low vision aids (LVAs) are aiming at improving near vision for people who have near work and helping blind and partially sighted people to read. So the main role of low vision rehabilitation is to allow people to resume or to continue to perform daily living habits and to lead them to more productive and independent life by using the maximum of their remaining vision (Margrain T H, 2000).

The aim of the work

The aim of the work is to review literature on certain items. These items include definition of the low vision, causes of low vision, examination of low vision patient, determination and magnification of low vision, types of low vision aids and rehabilitation of low vision patients.

Chapter 1

Definition of low vision

Chapter 1

Low vision definition:

Low vision is a term that denotes a level of vision that is 20/70 or worse and cannot be fully corrected with conventional glasses (WHO, 1997).

Also it is a vision loss that cannot be corrected by ordinary eye glasses, contact lenses, medication or surgery. A person with low vision has extremely limited sight that interferes with daily activities (WHO, 1997).

Low vision should not be confused with blindness. People with low vision have some useful vision which can often be improved with low vision aids. Visual impairment may be mild or severe, low vision usually results in reduced central or reading vision, but may also result from decreased side (peripheral vision, a loss of color vision, or an inability to properly adjust to light, contrast or glare (Eleanor E. Faye, 1994).

The patient is legally blind when the best corrected central acuity is less than 20/200 (perfect visual acuity is 20/20) in his better eye or his side vision is narrowed to 20 degree less in his better eye .People who are legally blind still have some useful vision. It is estimated that 17% of people over the age of 65 are either blind or have low vision (Dandona R and Dandona L, 2001).

Several terms described in vision rehabilitation literature include ocular disorder, Visual impairment, visual disability and visual handicap. Ocular disorder is a disease, injury, or congenital anomaly. Visual impairment is a measurable reduction of the basic function such as visual acuity, visual field, contrast sensitivity, color vision and dark adaptation as compared with the normal age-matched population. Visual disability is a limitation of a person' ability to perform certain visual tasks. Visual handicap is the disadvantages experienced psychosocially and economically because of visual disability (Dandona R and Dandona L, 2001).

Revision of visual impairment definitions in the International Statistical Classification of diseases ICD:

Three major issues need to be addressed in the revision of these definitions. Definitions are based on best –corrected visual acuity, which exclude uncorrected refractive error as a cause of visual impairment, leading to substantial underestimation of the total visual impairment burden by about 38%.Second,the cut-off level of visual impairment to define blindness in the International Statistical Classification of Diseases is visual acuity less than 3/60 in the better eye, but with increasing human development the visual acuity requirements are also increasing suggesting that a level less than 6/60 be used to define legal blindness. Third, the International Statistical Classification of Diseases uses the term "low vision" for visual impairment level less than blindness which causes confusion with the common use of this term for uncorrectable vision requiring aids or rehabilitation, suggesting that alternative terms such as moderate and mild visual impairment would be more appropriate for visual impairment less severe than blindness. We propose a revision of the definitions of visual impairment in the International Statistical Classification of diseases that addresses these three issues. According to these revised definitions, the number of the blind persons in the world defined as presenting visual acuity less than 6/60 in the better eye would be a bout 57 million as compared with the World Health Organization estimate of 37 million, using the existing International Statistical Classification of Diseases definition of the best corrected visual acuity less than 3/60in the better eye would be about 202 million as compared with the World Health estimate of 124 million persons with low vision defined as best- corrected visual acuity less than 6/18 to 3/60in the better eye
(Dandona L and Foster A, 2002).