

Causes of Visual Impairment among Patients Referred to a Visual Rehabilitation Clinic in Iran

Alireza Ramezani, Maasome Pardis, Nasrin Rafati, Mohsen Kazemi-Moghaddam, Marzieh Katibeh, Pooya Rostami, Mohammad Hossein Dehghan, Mohammad Ali Javadi, Zahra Rabbanikhah
Ophthalmic Research Centre, Department of Ophthalmology, Labbafinejad Medical Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Purpose: Epidemiologic evaluation and investigating the causes of visual impairment in any society is a matter of concern and has a direct effect on the country's health care planning. In this study we describe causes of low vision and blindness in Iranian patients referred to rehabilitation clinics for taking vision aids.

Methods: In this cross-sectional study, visual acuity was classified based on best-corrected visual acuity in the better eye according to the World Health Organization definition (blindness, visual acuity [VA] < 20 / 400; severe visual impairment, VA < 20 / 200-20 / 400; mild to moderate visual impairment, VA < 20 / 60-20 / 200). The causes of blindness and low vision were determined using the 10th version of International Classification of Diseases based on the main cause in both eyes. To describe data, we used mean \pm SD and frequency.

Results: The study included 432 patients, 65% male, with a mean age of 43.6 ± 25.5 years (range, 3 to 92 years). Mild to moderate visual impairment, severe visual impairment and blindness were present in 122 (28.8%), 196 (46.4%) and 105 (24.8%) of the patients, respectively. The main causes of visual impairment were retinal and choroidal diseases (74.5%), optic nerve and optic tract diseases (9.8%), vitreous and globe disorders (5.3%), congenital cataract (3.1%), and glaucoma (2.6%). The distribution pattern of the causes was similar in all age subgroups.

Conclusions: Diseases of the retina and choroid are the main cause of visual impairment among patients referred to an academic visual rehabilitation clinic in Iran.

Key Words: Low vision disorders, Rehabilitation, Vision, Visual aids

Low vision and blindness are two important health and socioeconomic issues in developed and developing countries. Demographic conditions, socioeconomic status and cultural differences have a deep impact on the prevalence and distribution pattern of this disability. Additionally, the causes of their incidence in different ages vary and most of them are preventable [1]. Therefore, epidemiologic evaluation and examining the causes of visual impairment in any society is a matter of concern and has a direct effect on the country's health care planning.

Patients with visual impairment require special eye care including clinical evaluation, consultation and rehabilitation to improve quality of life and decrease their dependency [2,3]. In previous studies, the prevalence of low vision in patients older than 75 years was 10.3% and increased rapidly by age to about 30% at the ages of 90 years and above [4]. Since most untreatable, visually-impaired individuals receive services and visual aid equipment from rehabilitation clinics, an evaluation of the characteristics of referred patients is likely reflective of the general population's status.

In this study, we used clinic-based data from a tertiary referral clinic affiliated with a medical university that serves a representative population of similar clinics in Tehran, the capital city of Iran. The aim was to understand the common causes of low vision and blindness in patients

Received: August 24, 2010 Accepted: March 9, 2011

Corresponding Author: Alireza Ramezani, MD. Ophthalmic Research Centre, Labbafinejad Medical Centre, Boostan 9 Ave., Pasdaran St. Tehran 16666, Iran. Tel: 98-21-22584733, Fax: 98-21-22562138, E-mail: arramezani@gmail.com

© 2012 The Korean Ophthalmological Society

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/3.0/>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

who received services at this referral rehabilitation clinic.

Materials and Methods

This one-year descriptive study was conducted on completely blind and visually-impaired patients who presented at a rehabilitation clinic to receive visual aids. All patients provided written informed consent. Patients were examined by an expert optometrist. At the end of the examination, vision aids were prescribed based on visual acuity and patients' requirements. The vision aids consisted of typical far glasses, telescopic glasses (power 2× and 4×), max TV (power 2×) and electronic devices for far and near vision, hand-held magnifiers (with or without illumination), closed-circuit television, and electronic devices for near-vision.

Refractive error was measured using a retinoscope. Best-corrected visual acuity (BCVA) and uncorrected visual acuity (UCVA) were assessed using the Snellen chart. Patients were divided into three groups according to their BCVA following the World Health Organization classification method: 1) mild to moderate low vision ($20 / 60 < BCVA \leq 20 / 200$), 2) severe low vision ($20 / 200 < BCVA \leq 20 / 400$), and 3) blind ($BCVA < 20 / 400$) [5].

All physicians who referred the patients were asked to describe the main cause of low vision based on their clinical and paraclinical evaluations. For any referred patient without an exact diagnosis, further evaluation and diagnostic procedures were recommended and patients were referred to an expert ophthalmologist.

The International Classification of Diseases (ICD-10) was used to classify the patients according to the primary cause of low vision and blindness for both eyes [6]. Based on this classification, any disease is categorized by a spe-

cific code which itself is a subheading of a general heading that classifies the disorders based on the anatomic site of involvement.

To describe data, we used mean \pm SD and frequency (percent). All statistical analyses were performed using SPSS ver. 15 (SPSS Inc., Chicago, IL, USA).

Results

During the study period, 423 consecutively referred patients including 275 men (65%) and 148 women (35%) were enrolled. All were Caucasian. The age ranged between 3 to 92 years old and the mean age was 43.6 ± 25.2 years. Of those, 68 patients (16%) were illiterate and 305 patients (72%) reported having under high-school diploma degree and 50 patients (12%) reported having a high-school diploma or higher educational degrees.

All patients had some degree of visual impairments. BCVA less than 20 / 200 was seen in 71.2% of the patients. Table 1 displays the number of patients in each level of the visual impairment. Diagnosis was confirmed in 418 out of 423 patients. The most common cause (74.5%) of visual impairment in all ages was retinal and choroidal diseases (Table 2). In the retinal and choroidal group, macula and posterior pole degeneration were seen in 92 patients (29.6%) and diabetic retinopathy, retinitis pigmentosa, Stargart disease and macular dystrophy were seen in 58 (18.7%), 54 (17.4%), 35 (11.2%), and 30 (9.6%) patients, respectively (Table 3).

The main causes of low vision were categorized based on age (Table 2). It was noted that retinal and choroidal diseases were the leading cause of visual impairment across all age groups. We also examined the most common disorders in the retinal subgroup by age (Table 3) and we found

Table 1. Number of patients with different levels of visual impairment according to the World Health Organization classification

	BCVA range	No. (%)
Mild to moderate visual impairment	$20 / 60 < BCVA \leq 20 / 200$	122 (28.8)
Severe visual impairment	$20 / 200 < BCVA \leq 20 / 400$	196 (46.3)
Blindness	$BCVA < 20 / 400$	105 (24.8)

BCVA = best-corrected visual acuity.

Table 2. Frequency distribution of cases categorized by age and the causes of visual impairment based on the anatomic site of involvement

Age (yr)	Choroid and retina	Optic nerve	Vitreous and globe	Congenital cataract	Glaucoma	Others	Total
<14	30 (50.0)	21 (33.3)	0	3 (4.8)	0	6 (9.5)	60 (14.3)
15-30	78 (78.0)	4 (4.0)	0	10 (10.0)	0	8 (8.0)	100 (23.9)
31-50	61 (73.5)	9 (10.8)	8 (9.6)	0	0	5 (6.0)	83 (19.8)
>50	142 (81.1)	7 (4.0)	7 (4.0)	0	11 (6.2)	8 (4.5)	175 (41.8)
Total	311 (74.5)	41 (9.8)	15 (3.5)	13 (3.1)	11 (2.6)	27 (6.5)	418 (100)

Values are presented as number (%).

Table 3. Frequency distribution of choroidal and retinal causes of visual impairment by age

Age (yr)	Macular dystrophy	Albinism	Retinitis pigmentosa	Leber's congenital amaurosis	Stargart disease	Retinal detachment	Diabetic retinopathy	DMP	Retinal vein occlusion
<14	10 (33.3)	7 (23.3)	6 (20)	4 (13.3)	3 (10.0)	0	0	0	0
15-30	13 (16.7)	7 (8.9)	29 (37.2)	3 (3.9)	19 (24.4)	7 (8.9)	1 (1)	0	0
31-50	5 (8.1)	0	14 (23.0)	1 (1.6)	13 (21.3)	6 (9.8)	14 (23.0)	7 (11.5)	1 (1.2)
>50	2 (1.4)	0	5 (3.5)	0	0	3 (2.1)	44 (31.0)	85 (59.9)	3 (2.1)
Total	30 (9.6)	14 (4.5)	54 (17.4)	8 (2.5)	35 (11.2)	16 (5.2)	58 (18.7)	92 (29.6)	4 (1.2)

Values are presented as number (%).

DMP = degeneration of the macula and posterior pole.

that the distribution of the retinal disorders varied by age. The most common retinal disorder in the patients less than 30 years of age was macular dystrophy, while in the age group of 31 to 50 and above 50 years of age, it was diabetic retinopathy and degeneration of the macula and posterior pole, respectively.

Discussion

This study demonstrated that the leading causes (74.5%) of visual impairment, based on the major headings of ICD-10 classification, in patients referred to a visual rehabilitation clinic in Iran were retinal and choroidal diseases. Optic nerve and optic tract diseases, vitreous and globe disorders, congenital cataract and glaucoma were less common causes. Although this pattern of prevalence was observed across all age subgroups, the main causes responsible for visual impairment, according to the subheadings of the classification, varied among them. In patients less than 30 years of age, retinitis pigmentosa and Stargardt disease were the most prevalent. In adults between 31 to 50 years of age, diabetic retinopathy and retinitis pigmentosa were the most prevalence and in those above 50 years of age, degeneration of the macula and posterior pole were the most common causes.

In a retrospective study conducted with 4,711 patients who presented to a rehabilitation clinic in Tübingen (Germany), age-related macular degeneration was the most important cause (40%) of visual impairment, followed by tapetoretinal dystrophy, optic nerve atrophy and diabetic retinopathy [7]. In another retrospective study with 573 patients in a Malaysian rehabilitation clinic, the most common cause of visual impairment varied by age; congenital disease was most prevalent in individuals less than 30 years of age, those between 30 and 60 years of age reported the most retinitis pigmentosa, and those greater than 60 years of age reported the age-related macular degeneration [8]. In a study conducted with 362 students in three schools for the blind in Tehran (Iran), the rate of severe low vision was 8.9%. The most common cause of low vision in that study was retinal diseases (51%). Cataract, optic nerve atrophy, corneal and anterior segment disease, glaucoma,

anophthalmia and globe malformations were other common causes of low vision in schools in Tehran [9]. In the current study, 41.8% of our patients were above 50 years of age, which might explain the high prevalence of diabetic retinopathy and age-related macular degeneration. This finding is in line with the global data on visual impairment in the year 2002 [1].

The extant literature thus far suggests a preponderance of males with visual impairments. Nguyen et al. [7] found that 58.9% of the patients were male. In the current study, the majority (65%) of the enrolled populations were male as well. If we divide the cases into two groups (under 30 and above 30 years old) the male preponderance is still greater in the older group; 75.8% in patients above 30 years old versus 54.2% in adults under 30. The two most common diseases among patients older than 30 years old in our study were diabetic retinopathy and age-related macular degeneration, which have not been reported to be more frequent in men. In this sample, it appears that men more than women seek services from the rehabilitation clinic. Additionally in the current study, we noticed that a significant number of people with elementary or below a bachelor's level of education (88%) presented to the visual rehabilitation clinic, suggesting that highly educated people are not the only clients seeking to improve and increase their visual ability.

In the current study, retinal and choroidal diseases were the most common causes of visual impairment. There are three explanations possible: 1) retinal and choroidal diseases are less treatable and reversible compared with other ophthalmologic problems, 2) retinal and choroidal diseases are more frequent in our society, and 3) patients with these types of ophthalmic problems may be referred more often to rehabilitation clinics by ophthalmologists. Cataract problems are the main cause of visual impairment in most population-based studies [1]. Other causes in decreasing order of frequency include refractive errors, trachoma, glaucoma, macular degeneration and retinal diseases [6]. Since our study was conducted with referred patients to a visual rehabilitation clinic, the two common diseases (i.e., cataract and refractive errors), were not seen as major causes of vision loss in our population. These findings

confirm the first hypothesis because patients with cataract and refractive errors are usually managed properly in our society, especially in the capital city of Tehran.

The assumption of a higher prevalence of retinal diseases among our society (the second hypothesis) is supported by data from an epidemiologic population-based study performed in Tehran. It reported that the most common cause of visual impairment after two treatable diseases (refractory errors [33.6%] and cataract [25.4%]) was macular degeneration (20%). In this report, the prevalence of retinal vascular diseases was 4% [10]. Additionally, retinal diseases were also found to be the most common etiology (51%) of visual impairment among youth from schools for the blind in Tehran [9]. It is possible that not only the acquired but also the congenital forms of retinal disease are highly prevalent in our population. This finding converges with similar studies conducted in Brazil [11], Germany [7], India [12], Thailand [13], and the Netherlands [14] that show that the most common cause of low vision is retinal diseases. Conversely, in studies performed in Ethiopia [15] and Uganda [16], the anterior segment of diseases had a more important role in vision loss, which might reflect a high prevalence of infectious diseases and vitamin A deficiencies in these societies. Further, in a study with 3,210 children in Brazil, the most common cause of visual impairment in children with multiple disabilities were optic nerve atrophy (37.7%) and cortical blindness (19.7%). The authors emphasized the physical examination of other parts of the body in a child with optic nerve atrophy [11]. In the current study, optic nerve diseases had the second highest prevalence after the choroidal and retinal diseases.

This study did not involve all-blind people because they are not usually referred to rehabilitation centers. It should be cautioned that because this current study only examined those who presented at a rehabilitation clinic, the generalizability of these results is limited. However, this study identified the irreversible and untreatable causes of low vision in our society and could be helpful in planning for screening programs. Moreover, the results of these types of studies can be used in creating and informing guidelines of practice for rehabilitation clinics. Further studies especially in other cities with larger populations are warranted.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

References

1. Resnikoff S, Pascolini D, Etya'ale D, et al. Global data on visual impairment in the year 2002. *Bull World Health Organ* 2004;82:844-51.
2. De Carvalho KM. Recursos para visao subnormal. *Arq Bras Oftalmol* 1997;60:317-9.
3. De Carvalho KM, Minguini N, Moreira Filho DC, Kara-Jose N. Characteristics of a pediatric low-vision population. *J Pediatr Ophthalmol Strabismus* 1998;35:162-5.
4. Carvalho KM, Monteiro GB, Isaac CR, et al. Causes of low vision and use of optical aids in the elderly. *Rev Hosp Clin Fac Med Sao Paulo* 2004;59:157-60.
5. World Health Organization. *Consultation on development of standards for characterization of vision loss and visual functioning* [Internet]. Geneva: World Health Organization; 2003 [cited 2012 Feb 16]. Available from: http://whqlibdoc.who.int/hq/2003/WHO_PBL_03.91.pdf.
6. World Health Organization. *International statistical classification of diseases and related health problems. Vol. 1. Chapter I to chapter XII (Part A)*. 10th ed. Geneva: World Health Organization; 1992. p. 429-58.
7. Nguyen NX, Weismann M, Trauzettel-Klosinski S. Spectrum of ophthalmologic and social rehabilitation at the Tubinger Low-Vision Clinic: a retrospective analysis for 1999-2005. *Ophthalmologe* 2008;105:563-9.
8. Mohidin N, Yusoff S. Profile of a low vision clinic population. *Clin Exp Optom* 1998;81:198-202.
9. Mirdehghan SA, Dehghan MH, Mohammadpour M, et al. Causes of severe visual impairment and blindness in schools for visually handicapped children in Iran. *Br J Ophthalmol* 2005;89:612-4.
10. Fotouhi A, Hashemi H, Mohammad K, et al. The prevalence and causes of visual impairment in Tehran: the Tehran Eye Study. *Br J Ophthalmol* 2004;88:740-5.
11. Haddad MA, Sei M, Sampaio MW, Kara-Jose N. Causes of visual impairment in children: a study of 3,210 cases. *J Pediatr Ophthalmol Strabismus* 2007;44:232-40.
12. Herse P, Gothwal VK. Survey of visual impairment in an Indian tertiary eye hospital. *Indian J Ophthalmol* 1997;45:189-93.
13. Pathanapitton K, Ausayakhun S, Kunavisarut P, et al. Blindness and low vision in a tertiary ophthalmologic center in Thailand: the importance of cytomegalovirus retinitis. *Retina* 2007;27:635-40.
14. Van Rens GH, Chmielowski RJ, Lemmens WA. Results obtained with low vision aids: a retrospective study. *Doc Ophthalmol* 1991;78:205-10.
15. Kello AB, Gilbert C. Causes of severe visual impairment and blindness in children in schools for the blind in Ethiopia. *Br J Ophthalmol* 2003;87:526-30.
16. Waddell KM. Childhood blindness and low vision in Uganda. *Eye (Lond)* 1998;12(Pt 2):184-92.