Causes of Permanent Severe Visual Impairment and Blindness among Jordanian Population

Basel Turki Baarah, Raed Ali Shatnawi, Ahmed Essa Khatatbeh

Abstract:

PURPOSE: To report the causes of permanent severe visual impairment and blindness among Jordanian blind people.

MATERIALS AND METHODS: This study was conducted on 1422 legally blind or worse vision people of all ages who attended the ophthalmic division of a medical committee for evaluation of disabled persons from July 2013 through November 2014. They were divided into two age groups: adult group (998 cases) and childhood group (<16 years, 424 cases). Patients presented reports from their ophthalmologists detailing their eye examination including best-corrected visual acuity, slit-lamp examinations, and, if applicable, intraocular pressure, dilated ophthalmoscopy, and visual field and the primary cause of visual impairment. Blind defined as best-corrected visual acuity < 6/60 (20/200) and/or visual field of 20° or less.

RESULTS: Retinitis pigmentosa was the most common cause of blindness among adult group (29.7%) followed by diabetic retinopathy (19.9%) and glaucoma (15.8%). Congenital whole-globe malformations were the most common cause of blindness among childhood cases (16.7%) followed by retinopathy of prematurity (ROP) (15.8%) and retinal dystrophies (13.9%). Overall, blindness related to genetic diseases, illnesses, and trauma was present at 56.5% (803), 41.7% (593), and 1.8% (26) of cases, respectively.

CONCLUSIONS: Genetic diseases such as retinitis pigmentosa, diabetic retinopathy, and glaucoma were the dominant causes of blindness among adults, while whole-globe malformation, ROP, and retinal dystrophies were the dominant causes of childhood blindness. These major causes of blindness should be considered in future public health and nongovernmental organizations strategies for blindness prevention in Jordan.

Keywords: Blindness, causes, Jordan

Introduction

Globally, 32.4 million people were blind in 2010.[1] Blindness has a socioeconomic burden for the patients, the families, the communities, and the nation. There are few published studies on the causes of blindness in Jordan.[2-5] These studies provided data about curable and incurable blindness in only two different regions of Jordan. Other study reported data about causes of blindness at a specific age group of population (elderly),[6] but data about incurable blindness for all age groups and from all regions of Jordan were not reported. The purpose of the study was to report the causes of permanent (incurable) blindness among Jordanian population. The data were obtained during evaluation of Jordanian disabled persons including blind persons by a special medical committee formed from different medical specialties. The purpose of the committee was to assess if the disabilities of the disabled person are...
permanent and severe enough to be granted permission to own tax-free cars as governed by new law.

Material and Methods

The ophthalmic division of the medical committee for evaluation of disabled persons analyzed data for a total number of 1422 legally blind or worse vision people of all ages (range 3–87 years) who attended the committee from all regions of Jordan between July 2013 and November 2014. They were divided into two age groups: adult group (487 males and 511 females) and childhood group (aged <16 years; 217 males and 207 females).

Only legally blind or worse vision persons with permanent, irreversible blindness and known primary etiology of blindness were included in the study. Legally blind defined as visual acuity of 6/60 (20/200) or less in the better eye or a visual field restricted to 20° or less in the widest diameter of vision. This corresponds to severe visual impairment and blindness as defined by the WHO.(7)

The studied cases presented a report from their ophthalmologist detailing their eye examination including best-corrected visual acuity, slit-lamp examinations, and if applicable, intraocular pressure, dilated ophthalmoscopy, and visual field and the primary cause of visual impairment. The reports were analyzed, verified with the patient, and accepted if satisfied our inclusion criteria. The adult primary causes of blindness were classified into 14 different diagnostic categories, and the childhood primary causes were classified into 11 diagnostic categories [Tables 1 and 2].

Causes such as inherited and acquired corneal diseases opacities, retinal vascular accident and retinal vasculitis, eye trauma, and surgical complications are grouped.

Statistical analysis with proportional data was used to describe the study variables.

Results

Demographic data show that blind females are slightly more than males in adult group (female: male - 511:487), while in childhood group, boys are slightly more than girls (boy: girl - 217:207). The leading causes of blindness at the adult group were retinitis pigmentosa (29.7%, 296 cases), diabetic retinopathy (19.9%, 198 cases), and glaucoma (13.8%, 138 cases) [Table 1]. These followed by other retinal dystrophies (6.7%, 67 cases), corneal diseases opacities (6.2%, 62 cases), myopic macular degeneration (4.7%, 47 cases), retinal vasculitis and retinal vascular accident (4.5%, 45 cases), inherited optic nerve atrophy (3.5%, 35 cases), secondary optic nerve atrophy (3.0%, 30 cases), retinal detachment (2.8%, 28 cases), age-related macular degeneration (2.1%, 21 cases), trauma (1.7%, 17 cases), inherited vitreoretinopathy (0.8%, 8 cases), and malignancies (0.6%, 6 cases). However, the leading causes for blindness at the childhood group were congenital globe malformations (16.7%, 71 cases), retinopathy of prematurity (ROP) (15.8%, 67 cases), and retinal dystrophies (13.9%, 59 cases) [Table 2]. These followed by congenital cataract and its complications (13%, 55 cases), inherited optic nerve atrophy (11.1%, 47 cases), inherited vitreoretinopathy (8.3%, 35 cases), glaucoma (7.8%, 33 cases), corneal diseases opacity (6.6%, 28 cases), secondary optic nerve atrophy (3.1%, 13 cases), trauma (2.1%, 9 cases), and retinoblastoma (1.6%, 7 cases).

Overall, the frequencies of blindness related to genetic diseases, illnesses, and trauma were 56.5% (803 cases), 41.7% (593 cases), and 1.8% (26 cases), respectively [Figure 1]. Retinitis pigmentosa represents 37.7% (303 of 803 cases) of genetic diseases blindness [Figure 2] — considering that half of the children with retinoblastoma have a hereditary genetic defect.

Discussion

The WHO stresses the importance of collecting within-country data on causes of visual blindness for

| Disease                        | Number of cases (%) |
|--------------------------------|--------------------|
| Retinitis pigmentosa           | 296 (29.7)         |
| Diabetic retinopathy           | 198 (19.9)         |
| Glaucoma                       | 138 (13.8)         |
| Other retinal dystrophies      | 67 (6.7)           |
| Corneal diseases opacity       | 62 (6.2)           |
| Myopic macular degeneration    | 47 (4.7)           |
| Retinal vascular disease       | 45 (4.5)           |
| Inherited optic nerve atrophy  | 35 (3.5)           |
| Secondary optic nerve atrophy  | 30 (3.0)           |
| Retinal detachment             | 28 (2.8)           |
| Age-related macular degeneration| 21 (2.1)         |
| Trauma                         | 17 (1.7)           |
| Inherited vitreoretinopathy    | 8 (0.8)            |
| Malignancies                   | 6 (0.6)            |

| Disease                        | Number of cases (%) |
|--------------------------------|--------------------|
| Congenital globe malformations  | 71 (16.7)          |
| Retinopathy of prematurity      | 67 (15.8)          |
| Retinal dystrophies             | 59 (13.9)          |
| Congenital cataract             | 55 (13)            |
| Inherited optic nerve atrophy   | 47 (11.1)          |
| Inherited vitreoretinopathy     | 35 (8.3)           |
| Glaucoma                       | 33 (7.8)           |
| Corneal diseases opacity        | 28 (6.6)           |
| Secondary optic nerve atrophy   | 13 (3.1)           |
| Trauma                         | 9 (2.1)            |
| Retinoblastoma                  | 7 (1.6)            |
use in priority setting and resource allocation. The prevalence of diseases leading to blindness is different in various populations, depending on geographical location, culture, race, socioeconomic status, etc.

In developed countries like Canada, the major cause of permanent blindness is age-related macular degeneration (13%), while in China as a developing country, the major cause of blindness is myopic macular degeneration (19.4%). In our study, we observed that retinitis pigmentosa is the most common cause of blindness at adult group cases, in contrast to a study from Denmark where retinitis pigmentosa-related blindness is in the fourth place by frequency. In addition, our data support the data reported in 1996 that retinitis pigmentosa is the leading cause of blindness in Irbid, North Jordan. The current study observed that diabetic retinopathy was the second most common cause of blindness in contrast to a study from China where it represents the sixth leading cause of blindness. This might be related to a high frequency of the disease in Jordan due to consanguineous marriages and obesity (17.1%). Socioeconomic factors may also play a role; unawareness of the disease complications and noncompliance to diabetes management such as missing screening visits and not controlling of blood sugar are particularly common among Jordanian patients. Glaucoma as the third most common cause of blindness at adult group could be avoided and reduced by early preventive measures, such as early detection of the disease through a scheduled screening program and improvement of ophthalmic care for rural areas. Our frequency of glaucoma blindness is in accordance with frequency reported from Hungary (12.1%) and Nigeria (16.7%). Different studies from China found that degenerative myopia is the leading cause of blindness, an incident nonsimilar to the current study (3.3%). Age-related blindness was present in 1.5% of the current cases, much lower than in a study from Ireland (16.2%). This could be related to the average age of survival, where in developed countries is higher than that in developing countries.

There are approximately 1.4 million blind children all over the world, two-thirds of whom live in developing countries. Although it is not a major problem in terms of absolute number, childhood blindness accounts for a significant number of years with blindness. The major cause of childhood blindness we observed at studied cases was whole-globe malformation as in microphthalmia or anophthalmia (16.7%); this finding was in accordance with the finding from blind schools survey done in China. ROP encountered in 15.8% of cases as the second most common cause of blindness, while in a Czech Republic study, it was the major cause of blindness (41.9%). This common cause of blindness could be reduced and prevented by improvements in maternal and neonatal health care.

Retinal dystrophies as the third most common cause of blindness insure that inherited diseases are a major cause of blindness in this group, and preventive measures should be considered such as premarriages medical counseling. A high proportion of inherited childhood blindness was reported in studies from Indonesia (31.9%), Sri Lanka (35%), and Malaysia (29.5%). In the current study, 56.5% of blindness cases were attributed to genetic diseases and 37.7% of these cases were blind because of retinitis pigmentosa. This could be related to parental consanguinity marriages, which is widely present in our region.

Congenital glaucoma-related blindness was noted at 7.8% of cases in the current study, which is similar to findings by a study on visually handicapped children in Iran (7.5%). In a study from Indonesia, congenital cataract blindness was noted at 13.3% of blind school students, while in the current study, it was noted in much less frequency (3.9%).

The frequencies of corneal diseases blindness reported in the studies from Ethiopia and Turkey were 20.6% and...
15%, respectively,[27,28] while in the current study, it was as low as 6.2% at adult group and 6.6% at childhood group. This could be related to the availability and use of anti-infective agents in case of corneal inflammation and decrease in rate of malnutrition cases in the country. Trauma-related blindness in both groups was mainly related to explosions and road traffic accidents which could be avoided by preventive measures.

About 80% of blindness is curable and avoidable as mentioned in the WHO programs for prevention of blindness.[29] Implementing such programs will help in the prevention of curable blindness in Jordan, such as diabetic retinopathy, glaucoma, and ROP. Prevention of genetic diseases blindness is achieved through genetic counseling before marriages, implementation of molecular genetics, and recent findings in the management of genetic diseases.

The study gives data for a large sample of noncurable legally blind or worse vision patients from all over Jordan but not for all blind people; accordingly, it does not reflect the prevalence of blindness in Jordan. Because of this limitation, the reported data in this study will need to undergo adjustment if all blind people in Jordan were included.

**Conclusions**

Genetic causes of blindness represent more than half of studied cases in this survey of causes for permanent blindness in Jordan. Diabetic retinopathy, glaucoma, and ROP are the common causes of blindness among Jordanian population. Accordingly, these causes should be considered in the future preventive measures of blindness by public health and nongovernmental organizations involved in eye care and prevention of blindness in Jordan.

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**Conflicts of interest**

There are no conflicts of interest.

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