Original article

Pattern of blindness in a community based hospital of Nepal

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Abstract

Introduction: Because of the availability of modern health facilities and moderately easy access to health services in the last 25 years, the blindness due to cataract and trachoma is expected to decline in Nepal. So it is felt that the causes of blindness need to be revised. **Objective:** To regroup the disease pattern leading to permanent blindness in patients attending a suburban multidisciplinary community-based hospital of Nepal. **Materials and methods:** A cross-sectional, descriptive study was conducted in patients attending Dhulikhel hospital over a period of 12 months, from March 2010. Only the patients with best corrected visual acuity of < 3/60 were enrolled in the study. A detailed ocular examination was carried out. **Results: A** total of 76 eyes of 58 patients were analyzed. Of all, 32 were male (55.2 %). The mean age of the patients was 43.03 ± 22.98, with a range of 7 years to 84 years. Retinal diseases had the higher prevalence (23, 39.7 %) followed by amblyopia (10, 17.2 %) and corneal diseases (9, 15.51 %). Anisometropic amblyopia (3.94 %) was the commonest type of amblyopia. Retinitis pigmentosa (9.21 %) and age-related macular degeneration (7.89 %) were common retinal diseases whereas anterior staphyloma (5.26 %) and leucoma (3.94 %) were common corneal diseases. Other important and rare causes of blindness included ethambutol-induced optic neuropathy and vitelliform dystrophy. **Conclusion:** Periodic collection of statistics on the relative frequency of the causes of blindness is important in socioeconomically developing nations like Nepal. This helps to revise the pattern of blinding diseases so that priorities can be redefined.

Key-words: amblyopia, blindness, corneal diseases, retinal diseases

Introduction

Worldwide, about 45 million people are blind and about 87% of the visually-impaired live in developing countries. The global blindness prevalence was estimated to be 0.7% in 1990 (WHO, 2001). In Western populations, the epidemiology of visual impairment and its major causes have been well described and summarised in a series of meta-analyses. (Congdon et al, 2004; Kempen et al, 2004; Friedman et al, 2004).

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The data on the prevalence of blindness in developing countries like ours are entirely different from those in developed countries like the U.K. (Sorsby et al, 1966; Ghafour et al, 1983), Australia (Banks et al, 1981) and Netherlands (Doesschate, 1982). Based on the WHO definition, the prevalence of blindness in different Asian countries is as follows: Singapore, 0.5% (Saw et al, 2004), Malaysia, 0.3% (Zainal et al, 1996) and Taiwan, 0.6% (Hsu et al, 2004) which appears to be similar to estimates in the United States, 0.5% (Congdon et al, 2004). Similarly, higher prevalence has been observed in Mongolia, 1.5% (Baasanhu et al, 1994), Bangladesh, 1.5% (Dineen et al, 2003), rural

Indonesia, 2.2% (Saw et al, 2003) and India, 4.3% (Thulasiraj et al, 2003).

The Nepal Blindness Survey conducted more than 20 years ago, in 1981, showed that 0.84% of the Nepalese population was bilaterally blind and 1.66% was unilaterally blind (Brilliant et al, 1988). No national blindness survey has been conducted since 1981 but a few region-based surveys are present. The major causes of blindness in Nepal include cataracts, trachoma, corneal trauma, corneal ulceration, glaucoma, and vitamin A deficiency (Upadhyaya et al, 1991; Khatry et al, 2004). After the launch of the global campaign "Vision 2020: The Right to Sight" by the World Health Organization (WHO) and International Agency for Prevention of Blindness (IAPB), Nepal government also addresses blindness as one of the major health agendas. Vision loss due to cataract is decreasing due to affordable services in most parts of the world. In most of the cases, the visual outcome from cataract surgery is expected to improve. Therefore, in urban areas with adequate eye care services, blindness and low vision due to posterior segment disease are increasing. Because of the improved health access and better health facilities, life expectancy of the Nepalese population is increasing. So, blindness due to age-related problems is also expected to increase.

This study aims to find out the causes of irreversible blindness (satisfying the WHO definition) in a multidisciplinary community-based hospital. It is based in a suburban area of the country which is 30 km from the capital city. The hospital provides health care facilities to approximately 1.9 million people from more than 50 (out of 75) districts of the country both through its hospital and outreach services (webpage, Dhulikhel Hospital). The results of the present study are expected to stimulate the authorities to conduct a new blindness survey in the country.

Materials and methods

This cross-sectional, descriptive study was conducted in patients attending the eye department of the Dhulikhel Hospital. It was conducted be-tween March 2010 and February 2011. The tenets of the Helsinki declaration were followed: full informed consent was obtained and participants were able to abstain or withdraw from the research at any time without having to give a reason. No participants withdrew after they were enrolled in the study. The study was approved by the local institutional research committee. Only those patients who visited for eye examination in the Department of Ophthalmology of Dhulikhel Hospital with a Best Corrected Visual Acuity (BCVA) of < 3/60 in one or both the eyes were enrolled in the study. The exclusion criteria were set as follows:

- Patients with unoperated cataract, and
- Patients whose visual acuity improved beyond 3/60 after any of the interventions - surgical, optical or medical.

Detailed patient particulars were collected in a predesigned pro forma. Ocular examination was carried out systematically in the following steps.

Assessments

Visual acuity and refractive examination

Visual acuity was assessed by self illuminating Snellen's vision box with multiple optotype at a distance of six meters. E-chart was used for illiterate subjects. All the measurements were recorded by an optometrist. If the subject could not read the upper most letter, corresponding to 6/60 acuity notion, the testing distance was reduced by one meter, representing acuity notion of 5/60. Similarly, acuity was recorded in a similar fashion reducing testing distance by one meter if the patient could not read the letter in the previous testing distance. This recorded visual acuity as 4/60, 3/60, 2/60 or 1/60. If the patient could not read the letter from one meter, then he/she was asked to count fingers in front of the eyes and it was recorded in feet as 'count finger at one/two feet'. If the patient could not count the fingers, then the hand was moved in front of the subject and asked if the subject could

perceive the hand movement (HM), recorded as HM positive (+) or negative (-). On negative response, the light was directed onto the pupillary area and asked if the subject perceived it or not and recorded as perception of light (PL) (+) or (-). If the subject perceived light, it was directed from the different four corners and projection of light (PR) was recorded as (+) or (-). The visual acuity testing was followed by retinoscopy. Retinoscopy was done with a retinoscope (Heine and Heine) at an arm's length distance (half a meter) estimating the refractive status of the eyes of subjects objectively, which was followed by subjective refraction in which the patient's response to the corrective lenses was assessed.

Slit-lamp examination

A systematic ocular examination was carried out in all the cases by an ophthalmologist with Topcon slit lamp under appropriate magnification and illumination in a semi darkened room. It consisted of the examination of:

- Periorbital region/lids and adnexa.
- Conjunctiva, episclera and sclera.
- Cornea, anterior chamber, iris, pupil and lens.
- Posterior segment evaluation consisted of the vitreous examination and fundus examination under mydriasis (Tropicamide 1%). Binocular indirect ophthalmoscopy with aspheric lenses (+ 20 DS / + 75 DS / + 90DS), direct ophthalmoscopy (Heine Beta 200) was carried out as needed.
- Intraocular pressure (IOP) was measured with applanation/schiotz tonometer depending upon the cases.
- Blood pressure was measured in all subjects. Blood sugar estimation was done in indicated subjects.
- Any special investigation was ordered as needed.
- A physician consultation was done whenever required.

Data were entered in Statistical Package for Social Sciences (SPSS) version 11.5. Results were interpreted as frequency and percentages.

Results

A total of 76 eyes of 58 patients were analyzed. Of the 58, 32 were male (55.2%) (Table 1). The mean age of the patients was 43.03 ± 22.98 years, with a range of 7 to 84 years.

Table 1:Age, sex and laterality of the blindness

Age	Sex		Laterality			
	Male	Female	Right eye	Left eye	Both eyes	Total
< 10	0	3	0	2	1	3
11 - 20	9	2	6	2	3	11
21 - 30	6	2	2	5	1	8
31 - 40	5	5	0	7	3	10
41 - 50	2	2	0	3	1	4
51 - 60	1	4	1	2	2	5
61 - 70	3	5	3	3	2	8
71 - 80	5	3	4	0	4	8
> 80	1	0	0	0	1	1
Total	32	26	16	24	18	58

The left eye was more (31.57%) commonly involved than the right eye. Bilateral involvement was equal (9 cases each) in the age below and above fifty. Males (34.48%) below 40 and females (24.13%) above 40 suffered more.

The more common causes of blindness were retinal diseases (23, 39.7%) followed by amblyopia (10, 17.2%) and corneal diseases (9, 15.51%) (Table 2). Corneal diseases were seen more (8 cases) in patients above the age of 30, whereas retinal diseases were more common (14 cases) below the age of 40. Glaucoma was seen more in the elderly population. Vitroretinal diseases were almost equally distributed in the young and the elderly subjects. Amblyopia was seen more in age below 30 years of age.

Table 2: The prevalence of blindness according to the aetiology

Age group	Type of blindness, No (%)							
	corneal	retinal	glaucoma	vitro-retinal	amblyopia	Lenticular	Others	Total
>15	1(1.7%)	2(3.44)	0(0.00)	1(1.7)	2(3.44)	0(0.00)	0(0.00)	6(10.34)
16-40	3(5.17)	12	1(1.7)	1(1.7)	5(8.62)	1(1.7)	2(3.44)	25(43.10)
41-60	3(5.17)	0(0.00)	2(3.44)	1(1.7)	3(5.17)	0(0.00)	1(1.7)	10(17.2)
> 60	2(3.44)	9(15.51)	1(1.7)	0(0.00)	0(0.00)	3(5.17)	2(3.44)	17(29.31)
Total	9(15.51)	23 (39.7)	4 (6.9)	3 (5.17)	10 (17.2)	4 (6.9)	5 (8.62)	58(100)

Others: Enucleated eye (anophthalmic socket), phthisis bubli, atrophic bulbi

Among the retinal diseases, macular diseases were more common followed by retinal peripheral diseases and optic nerve diseases. The common macular diseases included age -related macular degeneration (7.89%), vitelliform dystrophy (3.94%), macular hole (1.31%) and non-specific maculopathy (1.31%). Other vitro-retinal diseases included retinitis pigmentosa (9.21%), retinal detachment (1.31%), proliferative diabetic retinopathy (1.31%), pathological myopia (2.63%), macular branch vein occlusion (1.31%) and endophthalmitis (3.94%).

Optic nerve diseases included ethambutol-induced optic neuropathy (2.63%), compressive optic neuropathy (%1.31); glaucomatous optic atrophy (1.31%), congenital optic disc coloboma (1.31%) and morning glory syndrome (1.31%).

In the cornea, anterior staphyloma (5.26%) and leucoma (3.94%) were common.

Anisometropic amblyopia (5.26%) followed by strabismic amblyopia (3.94%) formed the bulk of the amblyopic cases. The anisometropic amblyopia consisted of one case of Marfan's syndrome and another one with Morning glory syndrome. Other common causes of blindness included phthisis bulbi (3.94%), atrophic bulbi (2.63%) and anophthalmic sockets (2.63%).

Evisceration was done mainly for perforated corneal ulcer and trauma. Complicated cataract and mature cataract with sensory strabismus contributed only 2.63% of the blindness. Almost three percent of (2.63%) the blind were aphakic after ICCE where no other ocular abnormality was detected. The summary of the major diseases has been presented in table 3.

Table 3: Summary table for the major diseases (N = 76)

Retinal	**No. (%)**	**Corneal diseases**	**No. (%)**	**Amblyopia**	**No. (%)**
RP	7(9.21)	Anterior staphyloma	4 (5.26)	Strabismic	3 (3.94)
ARMD	6 (7.89)	Leucoma	3 (3.94)	Anisometropic	4 (5.26)
Vitelliform Macular dystrophy	3 (3.94)	Corneal degeneration	2 (2.63)	Isoametropic	2 (2.63)
Optic neuropathy	3 (3.94)	Striate Keratopathy	2 (2.63)	stimulus deprivation	1 (1.31)
Others	14 (7.89)	Post keratoplasty graft rejection	1 (1.31)		
Total	33(43.42)		12 (15.78)		10 (13.15)

RP = Retinitis pigmentosa; ARMD = Age-related macular degeneration

Discussion

WHO statistics indicate that two-thirds of people suffering from visual impairment are women. In our observation, males suffered more (55.2%).This difference might be because of the inclusion bias as this is a hospital-based study. In male-dominated society like ours, women do not often visit doctors even though they have ocular problems (WHO, 1973). Different writers theorize that longevity, smoking, nutrition and environmental factors may be causing increased eye diseases in women in

developed nations, while poverty, infectious disease, and lack of access to health services are contributing to the statistics in developing countries. (Abou-Gareeb et al, 2001)

Our study population included 5.17% of children. They suffered from retinal diseases (3.44%), amblyopia (3.44%) and corneal diseases (1.7%). Contrary to previous studies, in which vitamin A deficiency is considered to be the main cause of childhood blindness, (WHO, 1995), we did not find any cases of blindness related to active vitamin A deficiency. However, the corneal disease we saw could be a sequel of vitamin A deficiency. In our study, blindness is observed to be more prevalent in younger population (11 to 30 years) which is in contrary to WHO facts. This may be due to more cases of amblyopia (12.07%) and retinal diseases (12.06%) presenting to us in this age group. Another reason behind this might be the involvement of these people in more visually-active tasks and being cautious enough about their visual problems to visit the hospital.

The 1981 Nepal Blindness Survey showed that 0.84% of the Nepalese population was bilaterally blind and 7.7% monocular blind (Brilliant, 1988). We also found that unilateral blindness is more common than bilateral blindness (69% vs. 31%). In the younger age group, unilateral blindness was seen to be more common, as most of the corneal diseases and amblyopia are unilateral conditions. However, in the older age group, bilateral blindness was seen more because diseases like proliferative diabetic retinopathy and age-related macular degeneration are bilateral and more common in the elderly population.

In studies by Upadhaya et al (1991), the major causes of blindness in Nepal included cataract, trachoma, corneal trauma, ulceration, glaucoma, and vitamin A deficiency. Similarly, in the zonal surveys carried out by Sapkota et al (2006) in Gandaki Zone, cataract was found to be the principal cause of blindness (60.5%) and refractive error was the dominant cause (83.3%) of vision impairment (<6/19). Similarly, in population-based prevalence surveys on blindness and visual impairment done in nine countries by Limburg H et al (2008), cataract was found to be the main cause of blindness (41 – 87%) followed by posterior segment diseases (7 - 47%).

Amblyopia was seen to be the second most cause of blindness in our study. We saw anisometropic amblyopia as the most common followed by strabismic and isoametropic amblyopia. Vimala et al (2005) found strabismic amblyopia as the main cause followed by anisometropic amblyopia. This discrepancy could be because of the self-referral bias with multitude of symptoms. Corneal blindness, which is reported to be rare in developed countries, was the third most common cause in this study.

It is because of the improved socioeconomic status and better hygiene leading to a decline in corneal infections, nutritional deficiencies and corneal injuries. We found anterior staphyloma and leucoma, which are the consequences of trauma and corneal ulcer, very common. Rakhi et al (1991) analyzed the causes of blindness in 1006 consecutive legally-blind patients in a large urban multidisciplinary medical center and found corneal blindness as a second leading causes of blindness, in order of frequency of incidence.

We observed that the prevalence of xerophthalmia is decreasing. But we found many cases with corneal opacity which might be a sequel of xerophthalmia and corneal ulcer. Recent population-based studies in western countries have revealed that age-related macular degeneration, glaucoma, and retinal vessel diseases including diabetic retinopathy and retinal vein occlusions are the most common causes of visual impairment in the elderly population (Attebo et al, 1996; Klaver et al, 1998; Weih et al, 2000).

In our observation, ARMD (7.89%) formed the majority of the cases whereas diabetic retinopathy (DR) accounted for much less prevalence (1.31%) among the retinal diseases. The reason for this increasing cases of ARMD could be due to smoking, urbanization of the populations, westernization of

lifestyles and also increasing disease awareness among the people (Wong et al, 2008). However, the reasons for a lower prevalence of DR in people with Indian origin compared to white people are unknown, but should be further investigated to understand possible variations in susceptibility to microvascular complications of diabetes.

We observed the rare causes of retinal disease to form a significant proportion of the blindness of which retinitis pigmentosa formed 9.21%, vitelliform macular dystrophy 3.94% and morning glory syndrome formed 1.31%. This may be due to the better diagnostic tools for the better visualization of the retina than in the past.

Conclusion

Our results provide evidence that apart from preventable and curable blindness, there is a huge burden of irreversible blindness in Nepal. Considered as rare causes, retinitis pigmentosa, ethambutol-induced optic neuropathy and vitelliform dystrophies are major causes of blindness in the present scenario. Refractive errors and amblyopia still need to be investigated early in the school days to reduce the lifetime blindness due to these conditions.

This study is expected to be followed by studies with larger sample sizes so as to revise the data on blindness prevalence. Simple and cost-effective intervention, better screening facility with trained specialists, genetic counseling and other strategies need to be focused to a larger population.

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