



BMH Medical Journal 2016;3(3):61-66 **Research Article**

Visual Impairment Among Subjects With Medically Refractive Corneal Diseases

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Abstract

Background: Corneal diseases constitute a major cause of visual loss and blindness in the world today, majority of which is avoidable.

Aim: The purpose of this study was to estimate the cause and severity of visual impairment among subjects with medically refractive corneal diseases.

Design: Retrospective chart review.

Material and methods: The details of cases (n=38) with medically refractive corneal diseases awaiting surgical management in the cornea clinic of a tertiary care hospital during a period of one year were recorded.

Results: 65.78% were >40 years of age. 26.31% had bilateral disease. Central cornea was involved among 70.83%. Most common cause of corneal blindness was corneal opacity (27.08%). Trauma constituted 30.76% corneal opacities. 77.08% cases had visual impairment. 52.08% were blind. Those with best corrected visual acuity (BCVA) >6/18 suffered from intractable glare and photophobia.

Conclusion: Identification of avoidable and treatable causes of corneal blindness can help to plan strategies in the prevention, cure and rehabilitation of subjects with corneal diseases.

Keywords: corneal blindness, visual impairment, corneal opacity, keratoconus, bullous keratopathy, trauma, glare

Introduction

Diseases affecting the cornea are a major cause of blindness worldwide. [1] The true prevalence of corneal blindness in the Indian population is 0.45%, of which, nearly 95% cases are avoidable. [2] Corneal blindness occur secondary to a wide variety of infectious and inflammatory eye diseases. The resultant corneal scarring ultimately leads to functional blindness. Most of the causes of corneal blindness are avoidable or treatable. An array of topical drugs is available in the medical management of these diseases. Many of the corneal conditions are chronic and recurrent which necessitates long term medical therapy adding to financial burden. Moreover, medical management is not effective when complications occur and scarring sets in. The major obstacle in surgical intervention in the setting of a developing country like India is lack of reliable eye-bank facilities

and affordable surgical centers at the ground level. [2] The gross defective vision, the need for multiple surgeries, surgical inconvenience, financial burden, delay in postoperative visual recovery, long follow-up, subnormal visual acuity after the procedure and high complication rate makes surgical intervention for corneal blinding diseases an enigma. Hence public health prevention programs have an important role in decreasing the global burden of corneal blindness.

The purpose of this study was to estimate the severity of visual impairment in subjects with medically refractive corneal diseases and to assess the magnitude of avoidable and preventable corneal blindness among such a cohort.

Material and methods

The basic design of this work was retrospective chart review. The study was conducted after approval from the Institutional Ethics Committee. The details of cases with medically refractive corneal diseases awaiting surgical management in the cornea clinic of our institute, during a period of one year were recorded. The data regarding age, gender, laterality, presenting complaints, duration of the disease, coexisting systemic diseases, and ocular risk factors were noted. Infants and preschool children were excluded. Cases with other co morbid ocular diseases affecting retina and optic nerve were excluded. Cases with incomplete hospital data and subjects with vision of no perception of light were also excluded.

Details of ocular examination, best corrected visual acuity (BCVA), intraocular pressure (IOP) and B scan findings were recorded. Statistical analysis was performed using SPSS version 17.0. Chi-square test was used for univariate analysis. P value less than 0.05 was considered statistically significant.

Observations

The study group included 38 cases. Unilateral disease was noted among 28 subjects (73.68%). Bilaterality was seen among 10 cases (26.31%). 52.08% were males. Left eye was involved in 54.17% (26/48).

The mean age of the study group was 45.44 (SD 19.05). The age ranged from 9 to 73 years. 11 cases belonged to the age group 61 to 70 years. Age distribution of the cohort is given in **Table 1**.

Table 1: Distribution of cases based on the age group

Age groups in years	Number	Percentage
<10	1	2.63 %
11-20	6	15.78 %
21-30	2	5.26 %
31-40	4	10.52 %
41-50	6	15.78 %
51-60	7	18.42 %
61-70	11	28.94 %
71-80	1	2.63 %

65.78% (n= 25) were above 40 years of age. Younger age < 40 years was associated with bilateral disease (p 0.05).

The central cornea was affected in 34 eyes (70.83%). The peripheral cornea was affected among 8 eyes and both were affected among 6 eyes. The symptoms considered were pain, photophobia, redness and watering, apart from defective vision. 58.33% had symptoms of inflammation. Inflammatory features were observed more in those above 40 years of age (p 0.09).

The distribution of cases based on the etiology is given in **Table 2**.

Table 2: Distribution of the cases based on the etiology

Causes	Number of eyes	%
Corneal opacity	15	31.24
Bullous keratopathy	13	27.07
Corneal dystrophy	7	14.57
Keratoconus	7	14.57
Marginal Keratitis	4	8.33
Anterior staphyloma with Band keratopathy	1	2.08
Indolent Keratitis	1	2.08

85.41% (41/48) of corneal disease were due to preventable causes. Corneal opacities and bullous keratopathy formed the major reasons for defective vision. The incidence of corneal opacity and bullous keratopathy was significantly high among age more than 60 years (p 0.00). The chief cause for corneal opacity was penetrating injury due to trauma (30.76%). It was followed by bacterial ulcerative keratitis (23.07%) and sclerocornea (23.07%). Recurrent viral keratitis constituted 15.38% of causes. Thermal injury was noted in one eye. The chief cause for bullous keratopathy was cataract surgery (69.23%). This was followed by glaucoma (15.38%), trauma (7.69) and chronic uveitis (7.69). Pseudophakia was observed among 8 eyes (61.53%) with postsurgical bullous keratopathy. Aphakia was observed among one case.

The distribution of cases based on BCVA is given in **Table 3**. 52.08% had BCVA < 3/60 and were considered blind according to the World Health Organization definition of blindness.

Table 3: Visual impairment and blindness status by WHO categories

Visual acuity	WHO categories	Number	%
6/6–6/18	No impairment	8	16.66%
6/18–6/60	Visual impairment	11	22.91%
6/60–3/60	Severe visual impairment	3	8.33%
3/60—PL	Blindness	26	52.08

The commonest cause of low vision among the study group was corneal opacity. The major cause of blindness was bullous keratopathy (**Table 4**).

Table 4: Etiology and severity of visual impairment

Causes	Number of eyes with no visual impairment (%)	Number of eyes with low vision (%)	Number of eyes with blindness (%)	Total eyes
Corneal opacity	3 (20%)	5 (33.33%)	7(46.67%)	15
Bullous keratopathy	1 (7.69%)	3 (23.07%)	9 (69.23%)	13
Corneal dystrophy	1 (14.28%)	2 (28.71%)	4 (57.14%)	7
Keratoconus	0 (0%)	3 (42.85%)	4 (57.14%)	7
Marginal Keratitis	3 (75%)	1 (25%)	0	4
Anterior staphyloma with Band keratopathy	0	0	1 (100%)	1
Indolent keratitis	0	0	1 (100%)	1
Total	8 (16.67%)	14 (29.16%)	26 (54.16%)	48 (100%)

Visual dysfunction due to glare and haloes was observed among 6 out of 8 cases with BCVA >6/18. Anisometropia due to irregular astigmatism was the reason for visual impairment in the 5 cases with BCVA >6/18.

Corneal grafting was advised among 45 eyes. Supportive therapy was considered for 3 eyes. Those cases suffered from anterior staphyloma and band keratopathy. An attempt was made to correlate the visual impairment with the site, symptoms, cause, laterality, gender and age of the patients. Bilateral disease was associated with BCVA >6/18 (p 0.07). Younger age <40 years was also associated with BCVA >6/18 (p 0.04).

We found that the central location of the disease was associated with BCVA <3/60 (p 0.02). The symptoms of inflammation was associated with BCVA better than 3/60 (p 0.02).

Discussion

Corneal disease resulting in corneal scarring is one of the commonest causes of monocular and bilateral blindness among children and young adults. [1,2] It not only results in defective vision but also symptomatic disturbances like glare and haloes, affecting the binocular visual performance and thus quality of life in such cases. Hence even if the disease is unilateral, the resultant disability is of graver consequence. [2,3]

In this study we observed that the most frequent causes of visual impairment among subjects with medically refractive corneal diseases were corneal opacity and bullous keratopathy. Among these 85.41% were preventable. Dandona et al reported that the most frequent causes of corneal blindness in at least one eye included keratitis during childhood (36.7%), trauma (28.6%), and keratitis during adulthood (17.7%). In the Andhra Pradesh Eye Disease Study, nearly 95% of all corneal blindness was avoidable. [4]

Males (60%) were more affected than females; however this observation was not statistically significant. 28.94% belonged to the age group 61 to 70 years. 65.78% (n= 25) were above 40 years of age. This is in concordance with the observation that corneal blindness was significantly higher with increasing age. [4,5]

Corneal opacity was seen among 15 eyes. Corneal opacity was found more among those above 60 years. It constituted 34.25% of corneal diseases among those less than 60 years and 54.3% among

subjects more than 60 years (p 0.00).

Open globe injury was the sole cause of corneal scarring in the age group 20 to 40 years (3/3). Li Z et al suggests that trauma is often the most important cause of unilateral loss of vision in developing countries and that up to 5% of all bilateral blindness is a direct result of trauma. [6] Keratitis resulted in 80% of causes of corneal scarring among those between 41 to 60 years. Cao J et al has reported that corneal scarring was the most common indication for penetrating keratoplasty, half of which was due to keratitis. [7] Corneal ulceration is considered as a "silent epidemic" in developing countries. [8] Until recently, ocular trauma and corneal ulceration were not considered as important causes of corneal blindness. [9,10] Both trauma and ulceration are usually monocular and affected individuals are, therefore, not characterized as totally blind but only as visually disabled. [11,12]

Bullous keratopathy constituted major cause for significant visual loss among subjects above 60 years. Though the incidence of bullous keratopathy is much less compared to the cataract surgical rate nowadays, careful preoperative evaluation, control of comorbid factors and proper care of endothelium during the surgery can prevent this catastrophe. [13,14]

Keratoconus formed 14.6% of cases with medically refractive corneal disease in our study. Early screening of children, better topographic facilities, and widespread availability of preventive strategies like C3R in Kerala can be considered as reasons behind low numbers of blinding keratoconus in this cohort.

Younger age <40 years, bilaterality and presence of inflammatory symptoms were associated with BCVA better than 20/400. This can be accounted by early referral in such cases. Central location of the disease was associated with BCVA <3/60. However even in cases where the paracentral area was involved, the subjects suffered from intractable glare and haloes affecting the binocular function. Those with peripheral disease had irregular astigmatism with anisometropia preventing visual rehabilitation with spectacles.

Use of traditional remedies is considered as important reasons for corneal blindness. [15] However none of the cohort had history of traditional medicine use. Dandona et al reports that corneal blindness due to trauma and keratitis was more common in males, and corneal blindness due to traditional eye medicine and post cataract surgery was more common in females. [15] No such relations were noted in our study.

Our study had certain limitations. The study being a retrospective one, it is prone to problems with data retrieval, which a prospective study can overcome. The number of cases belonging to each age group and disease category were limited. The paucity of cases with congenital anomalies may be due to bias introduced by exclusion of infants and preschool children. We did not describe the type of trauma, the contribution of cataract in at least a few cases with reasonable vision which can jeopardize the functional outcome. Subjective variation in the visual acuity assessment and lack of adequate data among each subgroup with similar duration of symptoms further adds to the error.

Conclusion

The burden of corneal blindness encompasses a variety of corneal infections and trauma, the majority of which are avoidable. Safety in workplace, identification of at risk person, early referral to a tertiary center and judicious use of definitive therapy can reduce the incidence of blinding complications and sequelae of trauma. Implementation of preventive strategies may be a preferred option.

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