

# **An Etiological study of Corneal Blindness : A cross sectional study**

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## **I. INTRODUCTION**

W.H.O. defines economic blindness as "best corrected visual acuity of 6/60 or below in better eye." The biggest misery a person may experience is blindness.

Loss of sight is akin to losing a workforce, which weakens the economy of the entire society.

A person who is blind develops self-loathing and dependence on their family and country.<sup>1,2</sup>

A condition known as corneal blindness occurs when the cornea's transparency is compromised, preventing light from passing through the cornea and reaching the retina leading to visual impairment.<sup>3</sup>

1 billion people in the world have vision impairment. These 1 billion people have moderate to severe distance vision impairment due to corneal opacity (4.2 million cases), retinopathy changes brought on by diabetes (3 million cases), trachoma (2 million cases), uncorrected refractive error (123.7 million cases), cataract (65.2 million cases), glaucoma (6.9 million cases), presbyopia (also close to 826 million cases).<sup>4</sup>

After cataracts, corneal disease is now the second most- common- cause of blindness- in emerging countries like India.<sup>5,6</sup>

According to reports, India has the biggest population of corneal blind people in the world, with a prevalence rate of 0.45%.

Contrary to cataract, cornea related blindness usually lasts a person's entire life because there aren't enough resources for corneal transplantation.

A person's ability to see depends on number of variables, including the availability of care, intercessions, and visual rehabilitation (including the use of glasses and other assistive devices), as well as whether they have trouble accessing distant information, structures, and transportation.<sup>7,8</sup>

Any severe injury to the cornea, such as an infection, trauma, degeneration, or nutritional insufficiency, dystrophy can cause corneal opacity and vision loss. Each year, more than 50% of new occurrences of pediatric blindness are caused by Vitamin A deficiency.<sup>9</sup>

Xerophthalmia, is brought on by a Vitamin A deficiency and can be made worse by the measles, diarrhoea, or any other illness that affects the young and undernourished.

Additionally, 3.5 lakh infants are impacted by blindness each year due to congenital diseases (Born blind) A number of genetic and acquired conditions, including Pseudophakic Bullous Keratopathy, Fuch's Endothelial Dystrophy, and other corneal degenerations and dystrophies, can also result in a severe loss of eyesight.<sup>10,11</sup>

Several eye disorders can affect clarity of cornea, but one of the most- common- cause of corneal visual impairment in India is trauma to the eye.

India has rich system of using traditional medicine for various pathologies, like using honey as an eye drop and ginger juice for cleaning the eyes, kajal as well as the indiscriminate usage and administration of steroid eye drops by pharmacists and quacks, have the potential to be devastating.

Corneal injuries, particularly those caused by vegetable matter, are common among farmers and children. If left untreated, even minor corneal abrasions can cause irreversible vision loss.

Contrary to cataract, glaucoma, and age-related macular degeneration, corneal blindness primarily affects youth, in low- and middle-income populations, infections and trauma continue to be the leading causes, followed by inadequate access to quality eye care.

Depending on how much corneal tissue contributes, any pathology in the cornea will either cause varying degrees of opacification, determine that the cornea remains clear, or eventually cause it to break.

Due to a lack of eye donation and legal eye banking, individuals with corneal visual impairments must undergo some sort of keratoplasty in order to recover their vision. As a result, the long line of people waiting in this queue is growing to alarming proportions.

Therefore, encouraging eye donation and transplantation while also preventing corneal blindness by raising knowledge of eye illness and encouraging prompt treatment is the most- crucial direction for reducing corneal blindness.<sup>12</sup>

The current review is meant to serve as a reality-finding exercise to locate the incident and identify the etiological profile of corneal- blindness, that was first reported at a Tertiary eye Centre in the Bareilly district.

## II. METHODS

It is a hospital based cross sectional observational study conducted at Department of Ophthalmology Rohilkhand Medical College and Hospital, Bareilly.

The total number of cases studied were 50. The patient's record was assessed on pre-designed Performa. Patients who came in OPD of the Department during the study period were included in the study. Ethical clearance prior to the commencement of study was obtained from the Ethics committee of Medical College & Hospital,

### INCLUSION CRITERIA

Patient detected with corneal pathology as assessed on slit lamp bio- microscopy. Evaluated patients having a best corrected visual acuity of 6/60 (snellen's chart) or less. Patient giving an informed consent for the study.

### EXCLUSION CRITERIA

Vision >6/60 (Snellen's chart), Patient with ocular comorbidities other than corneal disease accounting for poor vision.

### DATA COLLECTION

All the patient's coming to eye OPD at Rohilkhand medical college and Hospital, Bareilly fulfilling the inclusion and exclusion criteria were evaluated for best corrected visual status. Patients with corneal pathology were identified and were included in study after obtaining informed consent. History and appropriate investigation were done to establish possible etiology. Participants were evaluated for detailed eye examination, slit lamp bio microscopy, keratometry, corneal staining (wherever needed), tear film break up time and intraocular pressure performed whenever necessary. Visual acuity was recorded in Snellen's chart and landolt's charts for illiterate patients. All the cases with corneal pathology with best corrected visual acuity  $\leq 6/60$  irrespective of visual acuity of the other eye were included in this study.

**Table 1: Corneal Blindness Data Statistics**

No. of patients (Total OPD patients)	10445
No. of cases of corneal blindness	50
Percentage (%)	0.47%

The statistics for corneal blindness is shown in the table above; the prevalence- was 0.47% for a total of 50 instances out of 10445 cases that were taken into consideration throughout the study period that attended the Eye OPD in the study duration.

## III. Result and Observation

The present study was based on 50 cases of corneal blindness attending OPD at the department of Ophthalmology at Rohilkhand Medical College, Bareilly UP during a period of 1 year.

Out of 50 consecutive patients having corneal blindness, 37 were male (74 %) and 13 were female (26 %) Table 2; involvement was unilateral in 45 patients (90 %) and bilateral in 5 patients (10 %) Table 3. Table 4; Depicts distribution of corneal blindness according to age majority of cases (32%) occurring in the 51 to 60 years of age group. Additionally, the age categories of 31–40 and 41–50, together made more than one-third of the sample, mean SD **34.88±18.99** (min to max 4 to 64 years). Table 5; infective keratitis was identified to be the major aetiology in our study affecting 21 patients (42%) out of total 50. Trauma being the second major cause involving 17 patients (34%) out of which 13 were mechanical trauma and 4 were chemical injury. Nutritional deficiency and corneal degeneration each contributes 6%. Trachoma, keratoconus, congenital, postsurgical bullous keratopathy and corneal dystrophy were least common. Table 6; People who work outdoor were most affected. Farmers were most affected total of 26% followed by labour and factory worker 12% each, mechanic 10%. Housewife, unemployed, student were 8% each. Child, office worker 6% each and shopkeeper 4%.

**Table 2: Distribution of cases according to sex**

Sex	Number	Percentage (%)
Female	13	26.00
Male	37	74.00
<b>Total</b>	<b>50</b>	<b>100</b>

**Table 3: Distribution of cases according to Eye involved**

Eye involved	Number	Percentage (%)
Right	25	50.00
Left	20	40.00
Bilateral	5	10.00
<b>Total</b>	<b>50</b>	<b>100.00</b>

**Table 4: Distribution of cases according to age**

Age	Number	Percentage (%)
≤10	4	8.00
11 to 20	3	6.00
21 to 30	6	12.00
31 to 40	8	16.00
41 to 50	9	18.00
51 to 60	16	32.00
>60	4	8.00
<b>Grand Total</b>	<b>50</b>	<b>100.00</b>
<b>MEAN ± SD</b>	<b>34.88±18.99 (4 to 64) years</b>	

**Table 5: Distribution of cases according to etiological factor**

Etiological Factor	Number	Percentage (%)
Infective Keratitis	21	42.00
Mechanical trauma	13	26.00
Chemical injury	4	8.00
Corneal degeneration	3	6.00
Nutritional deficiency	3	6.00
Trachoma	2	4.00
Keratoconus	1	2.00
Congenital	1	2.00
Corneal dystrophy	1	2.00
Pseudophakic bullous keratopathy	1	2.00
	<b>50</b>	<b>100.00</b>

**Table 6: Distribution of cases according to Occupation**

Occupation	Number	Percentage (%)
Farmer	13	26.00
Labour	6	12.00
Factory worker	6	12.00
Mechanic	5	10.00
Unemployed	4	8.00
Student	4	8.00
Housewife	4	8.00
Child	3	6.00
office worker	3	6.00
Shopkeeper	2	4.00
	50	100

#### IV. DISCUSSION

Out of 10445 patients that were taken into account during the study duration percentage of corneal blindness was 0.47% in 50 cases. Almost similar observation was found in other studies, **Veladanda R et al in (2016)**<sup>13</sup> conducted a hospital-based study over a period of 1 year from august 2014 to august 2015, Total 33,566 patients were examined, proportion of corneal blindness was 3.9% (CI-95% 3.6% to 4.3%). In our study, male's preponderance was observed, this is consistent with the earlier observation of **Nangalia P et al (2019)**<sup>14</sup> 56% males and 44% females were affected with corneal blindness. Males are the majority of working class; hence exposure to risk factors is more.

In our study, outdoor workers were predominantly affected. Farmer 26% followed by labour and factory worker 12% each, mechanic made 10% of the total cases which is in consonance with the result obtained by **Ravinder K et al (2016)**<sup>15</sup> corneal blindness was common in people who were working in agricultural field accounting for about 48%. **Dube DG et al (2018)**<sup>16</sup> highest incidence of corneal blindness was found in farmers. Thus, in our study, 13 Farmers were affected out of which injury by vegetative matter was the commonest cause.

Right eye is most commonly affected. Unilaterality was observed in 90% cases. Our observations show that unilateral corneal blindness is more common than bilateral. Bilateral cases were of corneal degeneration and keratoconus. Our observation was consistent with studies conducted by **Nagpal H et al (2020)**<sup>17</sup> found 69 patients (92%) had unilateral involvement, and 6 patients (8%) had bilateral involvement. **Kounser A et al (2022)**<sup>18</sup> the involvement was 92.8% unilateral and 7.2% bilateral.

In our study, it was found that corneal dystrophy, pseudophakic bullous keratopathy, keratoconus, and congenital factors were the least common (only 2% each), while nutritional deficiency and corneal degeneration accounted for 6% cases each, trachoma 4%, chemical injury 8% and infective keratitis accounted for 42% of cases. Our findings were consistent with the findings of **Attis S. et al (2015)**<sup>19</sup> showed corneal blindness caused by trauma (37%), infection (33%), congenital and developmental cause (15%) and degeneration and dystrophy (15%) **Veladana R. et al (2016)**<sup>13</sup> found trauma (59.3%), infectious keratitis (23.2%), corneal degenerations (12%) and postsurgical bullous keratopathy (5.5%) are responsible for the major burden of corneal blindness. Malnutrition due to Vitamin A deficiency is also an important factor of childhood corneal blindness. **Kounser A et al (2022)**<sup>18</sup> also observed that Kashmir has a temperature that is relatively lower than most states, which creates favourable climatic conditions for viral growth and progression, especially for the herpes group of viruses.

In our study, it was observed that trachoma was 4%, **Burton MJ, et al (2009)**<sup>20</sup> in study found that there were 1.3 million people who were blind due to trachoma and approx. 8.2 million people who were suffering from trichiasis. Active trachoma is no longer a threat, but persons who suffered from trachoma in their young age and due to repeated infections over the years are prone for complication like trichiasis ultimately leading to opacity in cornea.

In our study corneal opacity that has occurred due to trachoma was 4%.

## V. CONCLUSION

Post-traumatic and post-infectious corneal opacities/scars, which are the most common factor for corneal blindness, could be prevented by avoiding risk factors. Additionally, recognized as a treatable condition of corneal blindness is vitamin A insufficiency, which causes Xerophthalmia. Strategies to promote eye health are necessary to spread knowledge about the causes and prevention of corneal blindness.

Controlling avoidable causes, necessitates widespread public support and active community involvement. It is a matter of public health. Blindness that is curable or treatable involves a range of treatments, including prescription of drugs, optical rehabilitation, and corneal transplantation. Designing efficient preventative, promotional, and restorative blindness control strategies necessitates routinely analysing the trends and the load of corneal blindness.

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