

## A STUDY ON PREVALENCE AND CAUSES OF CORNEAL BLINDNESS IN PAEDIATRIC AGE GROUP

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### ABSTRACT

#### BACKGROUND

Corneal disease is responsible for less than 2% of blindness in children in industrialised countries. In poor countries of the world, corneal scarring occurs due to vitamin A deficiency, measles and ophthalmia neonatorum. Thus, corneal disease is an important cause of blindness among children living in developing nations, which already carry a major burden of blindness.

The aim of the study is to study the-

1. Prevalence of corneal blindness in the paediatric age group.
2. Causes of corneal blindness in the paediatric age group.
3. Morbidity of corneal blindness in the paediatric age group.

#### MATERIALS AND METHODS

It was cross-sectional observational study.

Study Period- December 2014 to August 2016.

Study Done- Government General Hospital, Kakinada.

Sample Size- 50 patients.

Inclusion Criteria- Children of age group 6 to 12 years with corneal blindness who have attended the outpatient department during the study period.

Exclusion Criteria- Children with childhood blindness other than corneal pathology.

Study Tools- Predesigned, semi-structured questionnaire regarding age, sex and age of onset of visual loss, laterality, history of ocular injury, vitamin A immunisation, family history of consanguinity and place of residence and socioeconomic status was taken. Visual acuity was measured using an E optotype and Landolt broken C chart with best corrected vision. Visual loss was classified according to the WHO categories of visual impairment. Ophthalmic examination was done by slit lamp and B scan.

#### RESULTS

Ocular trauma and corneal ulcers are most common cause of corneal blindness. 84% of corneal blindness cases were preventable and curable.

#### CONCLUSION

Trauma was the commonest cause of corneal blindness followed by infectious keratitis. 84% of corneal blindness was preventable and curable. Most causes of corneal blindness were avoidable.

#### KEYWORDS

Corneal Blindness, Avoidable Blindness, Visual Acuity, Visual Loss.

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#### BACKGROUND

The WHO in 1975 defined blindness as the inability to count fingers at a distance of 3 meters (<3/60) with the better eye, even after being provided best spectacle correction. Severe visual impairment as a corrected acuity in the better eye <6/60.

In India, the National Programme for Control of

Blindness defined blindness as visual acuity of <6/60 (inability to count fingers at 6 meters or unable to read the top-line of Snellen's visual acuity chart) in the better eye with the available correction.

**Prevalence-** In low income countries, the prevalence of blindness in paediatric age group maybe as high as 1.5 per 1000 children<sup>1,2</sup> compared to developed countries.

**The Scale of Problem of Childhood Blindness-** 3.8% of the global blindness are between 0 and 14 years. However, this prevalence of blindness in children is an underestimate of the magnitude of the problem, because the mortality among blind children particularly in developing world is higher than their sighted counterparts and the prevalence takes into account only children who survive.

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Many die in childhood from the underlying causes, such as measles, meningitis, rubella, prematurity, genetic diseases and head injuries. Most blind children are either born blind or become blind before their fifth birthday. Owing to demographic differences, the number of children who are blind per 10 million population varies from approximately 600 in affluent countries to approximately 6000 in very poor communities. About 40% of the causes of childhood blindness are preventable or treatable.<sup>3</sup>

**Significance of Childhood Blindness-** The control of blindness in children should be considered as a high priority.

There are several reasons for this-

- The number of “blind years” due to all causes of blindness in children is high.
- Many of the causes of blindness in children are either preventable or treatable.
- Conditions associated with blindness in children are also causes of child mortality.
- In India, blindness has devastating effects on individuals, families and communities impacting education and economic development.

Vision 2020- The Right to Sight, the plan of action for our country has included corneal blindness as one of target disease.<sup>4</sup>

**Aim-** Overall aim of the study was to study the prevalence and causes of corneal blindness in the paediatric age group who attended to tertiary eye care hospital, Kakinada.

**Objectives**

1. To study the prevalence of corneal blindness in the paediatric age group.
2. To study the causes of corneal blindness in the paediatric age group.
3. To study the morbidity of corneal blindness in the paediatric age group in children of age group 6 to 12 years with corneal blindness who have attended the outpatient department during the study period.

**MATERIALS AND METHODS**

Study Design- Cross-sectional observational study.  
 Study Period- From December 2014 to August 2016 as mentioned in study protocol.  
 Study Setting- Government General Hospital, Kakinada.  
 Sample Size- 50.

**Study Subjects-**

**Inclusion Criteria-** Children of age group 6 to 12 years with corneal blindness who have attended the outpatient department during the study period.

**Exclusion Criteria-** Children with childhood blindness other than corneal pathology.

**Study Tools-** Predesigned, semi-structured questionnaire regarding age, sex, age of onset of visual loss, laterality,

history of ocular injury, vitamin A immunisation, family history, history of consanguinity and place of residence (village, town or city) and socioeconomic status was taken. Visual acuity was measured using an illiterate Snellen E optotype and Landolt broken C chart with best corrected vision. Visual loss was classified according to the WHO categories of visual impairment. Simple tests of functional vision were used, such as the ability to walk around chairs unaided, the ability to recognise faces and to see printed shapes. Ophthalmic examination was done by slit-lamp examination, IOP recording and B scan refractive error correction.<sup>5</sup>

**Definitions Used in Study Age-** As told by the informant.

**Socioeconomic Status**

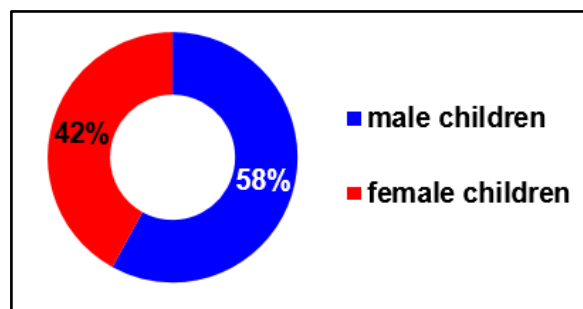
**Blindness-** Visual loss was classified according to the WHO’s categories of visual impairment.

**Avoidable Blindness-** Conditions that are amenable to primary prevention (for example, by measles and rubella immunisation) and those that are treatable (visual loss can be prevented by early diagnosis and prompt treatment).

**RESULTS**

Age Groups	Children
6-8 years	13
9-10 years	20
11-12 years	17

**Table 1. Age Wise Distribution of Study Subjects**



**Figure 1. Gender Wise Distribution of Study Subjects**

58% of study subjects were male children as compared to 42% of female children.

Age Group in Years	Boys	Girls
6-8	8	5
9-10	11	9
11-12	10	7

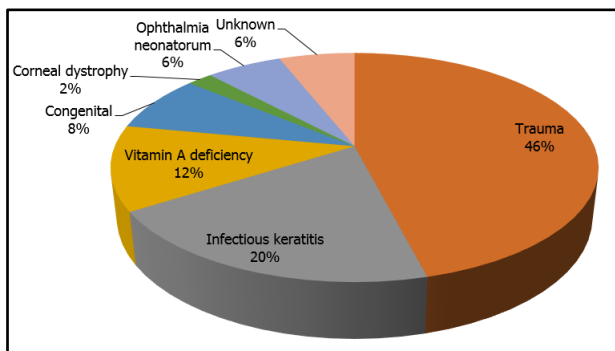
**Table 2. Sex Wise Distribution of Age Groups**

Out of total 50 subjects-

- 16% of the males were in the age group of 6-8 years as compared to 10% of female children.
- 22% of the males were in the age group of 9-10 years as compared to 18% of female children.
- 20% of the males were in the age group of 11-12 years as compared to 14% of female children.

Causes	Boys	Girls	Total	Percentage of Cases
Trauma	15	8	23	46
Infection	6	4	10	20
Vitamin A deficiency	2	4	6	12
Ophthalmia neonatorum	2	1	3	6
Congenital	3	1	4	8
Corneal dystrophy	0	1	1	2
Unknown	1	2	3	6

**Table 3. Distribution of Blindness in Paediatric Age Group Based on Aetiology**



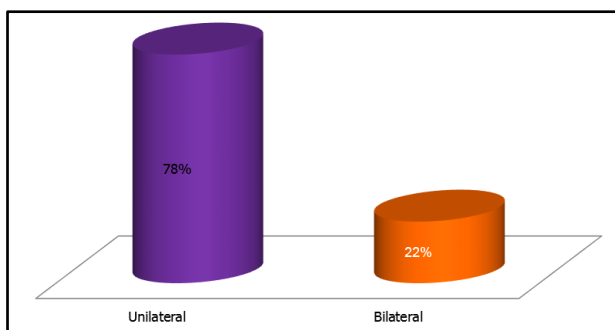
**Figure 2. Showing Distribution of Causes of Corneal Blindness**

Out of 50 cases studied-

- 46% of cases were due to trauma.
- 20% of cases were due to infectious keratitis.
- 12% of cases were due to vitamin A deficiency.
- 8% of cases were due to congenital causes.
- 2% of cases were due to corneal dystrophy.
- 6% of cases were due to ophthalmia neonatorum.
- 6% of cases were due to unknown causes.

Causes	Unilateral	Bilateral
Trauma	23	-
Infectious keratitis	9	1
Vitamin A deficiency	-	6
Congenital	2	2
Corneal dystrophy	-	1
Ophthalmia neonatorum	-	3
Unknown	3	-
<b>Total</b>	<b>37</b>	<b>13</b>

**Table 4. Distribution Based on Laterality**



**Figure 3. Showing Distribution of Unilateral and Bilateral Cases**

78% of cases were unilateral corneal blindness. 22% were bilateral.

Type of Injury	Percentage
Open globe	56
Closed globe	44

**Table 5. Distribution Based on Pattern of Ocular Injury**

56% cases were as a result of open globe injuries. 44% cases were closed globe injuries.

Object	Number of Cases
Wooden stick	4
Pencil	3
Due to fall	2
Broken eye glasses	1
Metal or sharp instrument	3
Hand of other person	2
Stone	1
Fire crackers	3
Road traffic accidents	3
Chemical	1

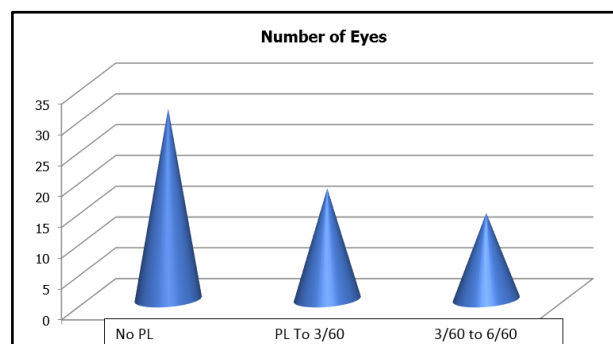
**Table 6. Types of Objects/Reason Causing Ocular Injuries**

Wooden stick was the commonest object causing ocular injury.

Visual acuity	No. of Eyes
No perception of light in one or both eyes	31
>= perception of light to 3/60	18
>3/60 to 6/60	14

**Table 7. Visual Acuity at Presentation**

Out of 63 eyes studied, 31 eyes had no perception of light in one or both eyes.



**Figure 4. Showing Visual Acuity at Presentation**

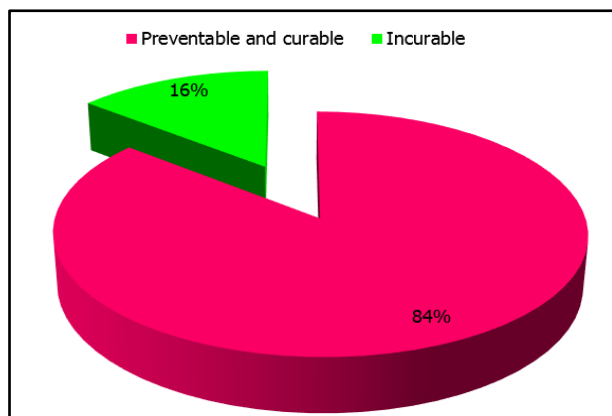
	No. of Cases	Percentage
Preventable and curable	42	84
Incurable	8	16

**Table 8. Distribution Based on Cure of Condition**

Out of 50 cases studied, 84% were preventable and curable, whereas 16% were incurable.

Locality	Number of Cases
Rural	32
Urban	18

**Table 9. Distribution Based on Locality**



**Figure 5. Showing Distribution of Preventable and Curable Causes**

**DISCUSSION**

**Sex Incidence-** A male preponderance has been noticed in all the studies. In this study, males were more commonly affected than females. A significantly greater proportion of male than female children were affected by corneal pathologies. This can be explained by the fact that trauma is the leading cause of corneal pathologies in children; boys are usually more involved in outdoor play than girls and indulge in more aggressive play, which predisposes them to injury.

**Prevalence of Corneal Blindness-** According to NPCB, corneal blindness is the second leading cause of childhood blindness. Corneal staphyloma, scar and phthisis bulbi attributed to vitamin A deficiency are the major causes of corneal blindness. Ocular trauma and corneal ulceration are significant causes of corneal blindness that are often underreported, but maybe responsible for 1.5-2.0 million new cases of monocular blindness every year.<sup>6</sup>

**Reasons for the Variation in Prevalence-** The prevalence of blindness is higher in children in countries with low and medium levels of development compared with highly-developed countries-

1. Some conditions only occur in very poor communities (e.g., vitamin A deficiency; use of harmful traditional eye remedies).
2. Conditions which can lead to blindness are being prevented in highly-developed countries, but are not being adequately controlled in poorer countries (e.g., measles infection, ophthalmia neonatorum).
3. Clinical services to restore sight or prevent blindness are less well developed in poor countries and parents may not understand the need for surgery or may not be able to afford the treatment. In the present study, trauma is a major cause of corneal opacity. There is a suggestion that trauma and microbial keratitis are important causes of corneal opacity in patients seen in this hospital, which serve a predominant agricultural population.

Corneal scarring is often associated with measles and vitamin A deficiency.

Reduction of blindness in India will require strategies that are more effective than those that have been pursued so far.<sup>7</sup>

The incidence of measles-related corneal ulcer and vitamin A deficiency has been reported to be on the decline.

- Most common cause of childhood blindness is of retinal pathology.
- Corneal blindness is the second common cause.

Corneal scarring due to trauma for approximately 70% of blindness in children.<sup>8</sup>

- 46% of cases were due to trauma.
- 20% of cases were due to infectious keratitis.
- 12% of cases were due to vitamin A deficiency.
- 8% of cases were due to congenital causes.
- 2% of cases were due to corneal dystrophy.
- 6% of cases were due to ophthalmia neonatorum.
- 6% of cases were due to unknown causes.
- Out of 50 cases studied 84% were preventable and curable, whereas 16% were incurable.

**CONCLUSION**

Corneal blindness (due to trauma) is the most common cause of childhood blindness.

Males were most commonly affected when compared with females because of more outdoor activity particularly in trauma cases.

Trauma was the commonest cause of corneal blindness followed by infectious keratitis, i.e. 46%.

Most common object of injury was wooden stick. 54% of children did not take vitamin A supplementation. 84% of corneal blindness was preventable and curable.

Children who were living in rural area were most commonly affected because of agriculture work.

Children of low socioeconomic status were commonly affected because of less attentiveness of parents, lack of knowledge of disease and fear of hospital charges.

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