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Prevalence of childhood blindness: Assessment at Regional eye hospital attending for visually handicapped certificate

Dr K. Revathy[1], Dr NusrathJahanShaik[2], Dr M. SatyanarayanaReddy[3], Dr N KasturiBai[4]

1 Professor, Department of Ophthalmology, Regional Eye Hospital, Kurnool Medical College, Kurnool. AP
2 Post Graduate , Department of Ophthalmology, Regional Eye Hospital, Kurnool Medical College, Kurnool. AP
3 Assistant Professor, Department of Ophthalmology, Regional Eye Hospital, Kurnool Medical College, Kurnool. AP
4 Assistant Professor, Department of Ophthalmology, Regional Eye Hospital, Kurnool Medical College, Kurnool. AP
Corresponding Author : Dr NusrathJahanShaik

Abstract
Aim: *To estimate the prevalence and causes of blindness in children coming to regional eye hospital (Kurnool) for visually handicapped certificate.*
Materials and Methods: *Data was obtained from children coming to hospital for the visually handicapped certificate. Total 132 children of age ≤ 15 years of age were enrolled for about period of one and half years. Visual acuity estimation, external ocular examination, Retinoscopy and fundus examination was done.*
Results: *The major causes of the blindness included congenital eye anomalies (30%) and retinal causes (13.6%). Corneal opacities caused about 7% and cataract with uncorrected aphakia and amblyopia about 15.2%, bilateral or unilateral phthisis bulbi was also common (9%) followed by optic atrophy (6.2%) and other causes (19%).*
Conclusion *: Among all causes leading to blindness in children preventable causes were about 21% , non treatable causes were about 50% and many others were treatable causes.*
Keywords :*Childhood blindness ; Prevalence ; Causes; avoidable*

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I. Introduction

Childhood blindness and visual impairment is a public health problem. The WHO estimates that 5,00,000 children per year are born blind or become blind during childhood. India has an estimated 320,000 blind children, more than any other country in the world(1). The prevalence of blindness in children ranges from approximately 0.3/1000 children in affluent regions to 1.5/1000 in the poorestCommunities . Globally there are estimated to be 1.4 million blind children, almost three-quarters of them live in developing countries.(2) The problem of childhood blindness evolved since it was recognised on a global scale in the 1980s. At that time the studies addressed blindness related to vitamin A deficiency and measles. In 1999, WHO launched "Vision 2020 - the Right to Sight," a global initiative for the elimination of avoidable blindness by 2020(3) and the childhood blindness is the priority for which Reasons includes,First, the cause of blindness in children is very different from that in adults. Second, unlike in adults, a delay in treatment can lead to amblyopia. Third, children's eyes are small and they respond differently to treatment.A blind child has many years of blindness ahead of them , with all associated emotional, social and economic costs to the child, family and society.Finally, blindness in children is associated with other co-morbidities(eg. Premature birth, measles, congenital rubella syndrome, vit A deficiency and meningitis)which influence the child's future, in education, occupation.(3)

Definitions **:**
UNICEF defines a child as an individual aged less than 16 years.
WHO defines blindness as a corrected visual acuity in the better eye of less than 3/60 and severe visual impairment as a corrected visual acuity in the better eye of less than 6/60
LOW VISION is impairment of visual functioning even after treatment and/ or standard refractive correction and has a visual acuity of less than 6/18 or a visual field of less than 10 degree from the point of fixation.
According to NPCB,

Total blindness- VA < 3/60 or 20/400 in the better eye with BCVA
Economic blindness – VA < 6/60 or 20/200 in the better eye with BCVA
One Eye blindness – VA < 3/60 in one eye and >6/60 in the other eye with BCVA
The term **avoidable** encompasses preventable and treatable causes. Preventable causes include
Corneal scarring due to: Vit A deficiency, measles, OphthalmiaNeonatorum, native practices (remedies) and infective corneal ulcers
Intrauterine factors: rubella, toxoplasmosis and other teratogens eg. alcohol
Perinatal factors: ROP , birth hypoxia
Hereditary diseases (consanguinous /genetic)
Treatable causes include Cataract, Glaucoma, ROP, Uveitis and Corneal disease (corneal ulcers and opacity)
Knowing prevalence and causes of childhood blindness is the basic requirement for developing strategies towards its prevention and management.Conditions amenable to primary prevention (i.e. where the condition causing blindness could have been entirely prevented) include measles infection, vitamin A deficiency, OphthalmiaNeonatorum , the use of harmful native eye medication remedies, and congenital rubella syndrome. Conditions that could have been treated early to prevent blindness (i.e. secondary prevention) include glaucoma and ROP. Causes of blindness where sight can be restored (i.e. tertiary prevention) include cataract and selected cases of corneal scarring. The provision of magnifiers and other low-vision devices is also important in restoring useful visual function.(11) Data can be obtained from various sources like Population surveys that include children from community based rehabilitation programmes and registers of blind , from the children attending blind schools and from hospital based studies.

II. Materials And Methods

Blindness was defined as presenting visual acuity of < 6/60 in the better eye. The data is from the children coming for visually handicapped certificate for a period of one and half year is total of 132 children of age ≤ 15 years of age. Among those children 58 were male and 74 were female child.

All of them presented with the complaint of reduced or loss of vision for which evaluation was done before ensuring blindness and providing Visually Handicapped Certificate. Evaluation included measurement of unaided and best corrected distance and near vision under standardised conditions, external eye examination, assessment of pupillary reaction, anterior segment examination with slitlampbiomicroscopy , ocular motility evaluation, retinoscopy and auto refraction under cycloplegia and fundus examination.Where ever necessary evaluation of posterior segment with B-scan and other electrophysiological tests were also performed.

III. Results

Among 132cases , age distribution of childhood blindness is more in female (n=74) than male children (n=58).

Table 1 shows age and sex distribution of childhood blindness

	0-5 years		6-10 years		11-15 years		Total	
Sex	male	female	male	Female	Male	Female	Male	Female
No's	09	10	20	29	29	35	58	74

Total blindness(binocular) Total blindness (binocular) was present in 18 cases (13.6%).

TABLE 2 Prevalence of total blindness – sex distribution

Total blind	18	13.6%
Male children	9	6.8%
Female chidren	9	6.8%

Table 3 Age distribution in binocular blind children

Sl no	Age	No of blind children	Female child	Male child
1	0-5 years	4	2	2
2	6-10 y	7	3	4
3	11-15 y	7	4	3
	Total	18	9	9

Table 4prevalence and cause of total blindness in children (vision – no PL to <3/60)

Sl no	Cause for blindness	Prevalence(no of cases)
1	Phthisis bulbi	5.25% (7)
2	B/L Anophthalmos	1.50% (2)
3	B/L Microphthalmos	0.75% (1)
4	B/L Coloboma of Iris, choroid involving macula	0.75% (1)
5	B/L Optic Atrophy	4.55% (6) (one is consecutive due to RP)
6	Lebers Congenital Amaurosis	0.75% (1)
	Total blindness percentage	13.6% (18)

Most common cause among total/ binocular blindness was Phthisis Bulbi(5.25%) which included 3 cases with bilateral phthisis (causes for bilateral include both congenital and acquired) and 4 cases were with unilateralphthisis and other eye with other eye complications (acquired) etiology. Acquired causes were mostly due to trauma, viral infections and harmful practices with native medicines. Next common cause is bilateral optic atrophy with 6 cases (4.55%) one among was consecutive optic atrophy due to retinitis pigmentosa.

Severe visual impairment Severe visual impairment involving both eyes was reported in 13 cases (9.75%).

Table 5 Causes for severe visual impairment(vision – 3/60 -6/60)

Sl no	Cause	No of cases	Percentage
1	Aphakia with amblyopia	3	2.25%
2	Oculocutaneous albinism	2	1.50%
3	Retinitis pigmentosa	3	2.25%
4	Retinal detachment with ROP	1	0.75%
5	Refractive error with amblyopia	2	1.50%
6	Microphthalmos with microcornea with coloboma of iris	2	1.50%
	Total cases	13	9.75%

Low vision (vision – BCVA >6/60 – 6/18)

Acquired causesCorneal opacities of various degrees ,High myopia andhypermetropia ,Squint, Healed choroiditispatches,Retinal detachments ,Pseudophakia after cataract surgery andPartial optic atrophy.

Congenital causescongenital cataracts,Coloboma of iris and choroid,miicrocorneaand megalocornea and oculocutaneous albinism were the causes.Rare causes like xerodermapigmentosa, familial exudative vitreoretinopathy, cone dystrophy were noted

High myopia which can be corrected to BCVA of better than 6/18 and some cases which can be managed with low vision aids were also advised accordingly and referred . Cases of congenital cataracts have been referred for higher centersfor surgeries and better outcome. Cases like blepharophimosis, severe ptosis with normal vision and few other conditions(also attended for visually handicapped certificates) requiring oculoplasty services were referred for better outcome.

Monocular blindness(one eyed) with normal better eye with visual acuity of 6/6 - 6/60 with BCVA was also included in study to know the unilateral causes of blindness. Most of them were acquired and sequelae of ocular trauma or viral infections but even congenital causes like cryptophthalmos (one child), anophthalmos ,coloboma , microphthalmos with microcornea were also seen. One case of optic disc hypoplasia with macular hypoplasia was noted.

Results compared using collected data, causes enumerated and classified according to two classifications. One is Anatomical classification based on the anatomical site involved and other is etiological classification based on the time of onset of the insult leading to visual loss.

Table 6Anatomical classification

Sl no	Anatomical site	No of cases	Most common causes	Percentage
1	Whole globe	38	Phthisis bulbi followed by empty socket, anophthalmos, microphthalmos	28.7%
2	Cornea	16	Corneal opacities	12.1%
3	Lens	13	Congenital cataracts (operated or unoperated)	9.8%
4	Uvea	9	Coloboma of iris, choroid	6.8%
5	Retina	18 10	Retinitis pigmentosa followed by re (Oculocutaneous albinism)	13.6% 7.57%
6	Glaucoma	1		0.75%
7	Optic nerve	9	Optic atrophy (primary / secondary)	6.8%
8	Cortical / amblyopia	18	Amblyopia isolated or due to aphakia and high anisometropia	13.6%
	Total	132		100%

Table 7Etiological classification

	Etiology	No of cases	Most common cause	
1	Hereditary	13	Oculocutaneous albinism	9.8%
2	Intrauterine	1	Torch infection (healed choroiditis patch)	0.75%
3	Perinatal	1	ROP	0.76%
4	Childhood	54	Corneal opacities, phthisis bulbi, amblyopia, optic atrophy, retinal detachments, cataracts	40.8%
5	Undetermined	63		48.4%
	Total	132		100%

Table 8 Withall the above data **most common causes** for childhood blindness can be listed as

	Cause	**Prevalance**
1	Phthisis bulbi	9 %
2	Retinal cause	13.6 %
3	Corneal opacities	7 %
4	Congenital anomalies	30 %
5	Cataract with uncorrected aphakia and amblyopia	15.2 %
6	Optic atrophy	6.2 %
7	Others	19 %
	Total	100 %

About 50% children had potentially avoidable cause of blindness:Preventable causes were about 21% which were corneal scarring, ROP, amblyopias. Treatable causes were about 29% which include refractive errors, cataracts, glaucoma. Nontreatable causes were about 50% .

IV. Discussion

With a population of approximately 75 million the number of blind children aged 0-15 years in Andhra Pradesh has been estimated to be 0.65 per thousand children that isabout 17,000. Present study is limited to geographical area in the state which do not represent the whole population. For low prevalence conditions such as blindness in children population based studies would have to be very large and therefore would be time consuming and expensive to perform. The advantages of this study is that it is cheaper and quicker to perform and uses a single observer. The results give an idea of the relative importance of different causes of blindness in children in a particular region and is required to design effective prevention of blindness programmes in the region.

In a previous study of blind schools, which included 1, 318 pupils in nine states of India, the major causes of blindness in children were corneal scarring in 26.4% (mainly due to vitamin-A deficiency), congenital globe anomalies in 20.7% (mainly microphthalmos), and retinal disease in 19.3% (mainly dystrophies).[4] The study showed marked regional variation in the major causes of blindness in children among the nine states.[4]. An another study Causes of childhood blindness in the north-eastern states of India which included 4 north indian states showed that the major anatomical causes of visual loss were congenital anomalies (anophthalmos, microphthalmos) in 36.1%, corneal conditions (scarring, vitamin A deficiency) 36.7%, cataract or aphakia 10.9%, retinal disorders 5.8% and optic atrophy 5.3%. Nearly half of the children were blind from conditions which were either preventable or treatable (48.5%).(7) These studies did not include Andhra Pradesh. In above studies major cause of blindness was due to Corneal scarring probably due to vitamin A deficiency, measles infection, ophthalmianeonatorum, and the effects of harmful traditional eye remedies predominate.

A CBR/CEC programme in the rural population of West Godavari district of coastal Andhra Pradesh found a low proportion of childhood blindness due to vitamin-A deficiency (5.5%), while the major causes of visual loss were congenital globe anomalies (25%) and retinal diseases (22.2%).(5) Another large study (APEDS)Andhra Pradesh Eye Disease Study(8,9) was a population based cross sectional study of all ages representative of the urban-rural and socioeconomic distribution of the population of the Indian state of Andhra Pradesh. From this study childhood blindness prevalence and causes were estimated. Results showed Congenital eye anomalies, retinal degeneration, and amblyopia due to congenital cataract and nystagmusmade up 50% of the total blindness. Corneal disease was responsible for 17% of the blindness, half of which could be attributed to vitamin A deficiency.

Our study shows consistent results with studies undertaken in Andhra Pradesh with major cause being congenital anomalies (30%) than corneal scarring/opacities (7%). Cataract and retinal causes were next major causes after congenital anomalies followed by Phthisis bulbi (9%) and optic atrophy(6.2%). And preventable and treatable causes among all blindness causes were 50% in this study, which was co-relating with all the above studies.

The anatomical causes as shown in table 6, globe anomalies(28.7%) predominate followed by retinal causes(21.17%) and cornea(12.1%). Later amblyopia related to various causes with 13.6%. lens related causes are 9.8%, uvea and optic nerve related lesions causing blindness are 6.8% each. Glaucoma in our study is only about 0.75%(one case).

The importance of hereditary factors (9.8%) and childhood factors (40.8%) contrasts with the small contribution from perinatal (0.75%) and intrauterine factors (0.75%). In 48.4% of children the abnormality had been present but the etiology could not be determined .The presence of a large proportion of children with visual loss of undetermined etiologyis consistentwith results from other studies using similar methods and reflects the limited investigations available and the lack of examination of family members in many cases.

A study of schools for the blind in south India had identified retinal dystrophies (including albinism) as the most common single cause of SVI and blindness(10), accounting for 26.1%.In our study retinal dystrophies accounted for 21.17% (including albinism) which was also almost nearer to the study.

Childhood blindness is a priority area for VISION 2020, a global initiative to eliminate avoidable blindness, because blind and visually impaired children have a lifetime of blindness ahead of them. Vitamin A deficiency– and measles-related blindness in children has declined substantially although it persists in some focal settings. With reductions in nutritional and infectious causes of blindness, intra-uterine and genetic causes of blindness (e.g., cataract and congenital anomalies) have assumed increased importance and need tertiary care–level interventions and long-term follow-up to achieve good visual rehabilitation.

Retinal diseases (mainly hereditary retinal dystrophies), and congenital abnormalities affecting the whole eye are important causes of blindness. The patterns of disease by underlying etiology also suggest that genetic diseases are important. Perinatal conditions (particularly retinopathy of prematurity (ROP) and lesions of the central nervous system) are less , while acquired conditions in childhood are more important in low income countries like India.

V. Conclusion

This type of studies are very essential to know the various causes and prevalence of childhood blindness. Understanding of relative magnitude of causes of blindness can be possible but information on cause specific-prevalence is not accurately possible.

In many cases childhood blindness was due to high refractive errors which can be easily treated. Preventable causes was about 21% which include corneal scarring and opacities, cataract related amblyopia, ocular conditions secondary to trauma and viral infections, and non treatable/non preventable causes was about 50% which include congenital eye anomalies, retinal causes, and nystagmus related amblyopia.

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