



PATTERN OF CHILDHOOD BLINDNESS IN EASTERN MAHARASHTRA

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ABSTRACT **Aim:** To determine the causes of blindness among children in the eastern region of Maharashtra. **Method:** This is an observational cross – sectional study where 634 children less than 16 years of age with visual acuity of less than 6/60 in better eye (NPCB) were included. All patients coming to ophthalmology OPD and children referred from school health camps from August 2019-july2022 were included in this study. The WHO/PBL eye examination record for children with blindness and low vision was referred to categorize the causes of blindness and to record the findings, using the definitions in the coding instructions. **Results:** 634 children were included. Based on the anatomical site involved, whole globe anomalies contributed to about 41.8% followed by lenticular (24.45%) and corneal causes (19.6%). Vitamin A deficiency was the most common cause of preventable blindness accounting for 12.6% and Cataract was the most common cause of treatable blindness (23.34). Almost half (46.68%) of the study population had either preventable or treatable causes of blindness **Conclusion:** A paradigm shift in causes of blindness has been observed over the years, however there's still a long way to go to reduce overall burden of childhood blindness especially in rural areas.

KEYWORDS : Childhood blindness, preventive causes, treatable causes, rehabilitative services.

INTRODUCTION

Childhood blindness has a far greater impact on individual and society as a whole considering the total number of disability adjusted life years lost. Childhood blindness is estimated to be the second leading cause of the burden due to blindness.¹ Blindness in children is of great concern due to its devastating implications of the individual and the society as a whole.

There are about 1.4 million blind children in the world, two thirds of whom live in the developing countries² The causes of blindness in children vary according to region and socioeconomic development.^{2,3}

Considerable regional variations exist between and within countries with regard to the magnitude and causes of childhood blindness. Population based data on the prevalence of childhood blindness, which are needed to set priorities and plan strategies to reduce childhood blindness, are limited worldwide including from India.^{3,4}

Hence, this study is undertaken to discern the pattern of childhood blindness in this rural and tribal area of eastern Maharashtra, as no data is available for the same.

MATERIALS & METHODS

This is a cross – sectional study conducted in a tertiary care hospital from August 2019 – July 2022. The study was undertaken after approval from the institutional ethics committee and adhered to the tenets of the Declaration of Helsinki.

In this study, a total of 09 schools were screened in eastern region of Maharashtra and children suspected to have visual impairment were referred to our tertiary care center. Relevant information was collected from class teacher and children. Required permission to screen school children was obtained from the principal of school and school authorities were requested to inform parents as well.

All children visiting ophthalmic OPD were also screened.

At the end of detailed visual examination, 634 cases of childhood blindness were identified.

All patients (age less than 16 years, according to UNICEF definition of childhood) with BCVA of <6/60 in better eye (According to NPCB definition of blindness) coming to ophthalmology OPD and referred from school screening camps were included in this study.

A logical and structured approach for history taking and examination in pediatric patients was followed.

Assessment of visual acuity was done as follow; for children less than

1 year by fixation pattern. For children between 1-2 years: boeck's candy test, For 2-6 years: Landolts C test and for >6 years: snellens chart was used.

Slit lamp examination, dilated fundus examination and retinoscopy was performed in each case to identify cause of childhood blindness.

The WHO/PBL eye examination record for children with blindness and low vision was referred to categorize the causes of blindness and to record the findings, using the definitions in the coding instructions.⁵

RESULTS

A total of 634 children under 16 years of age were examined in the eastern region of Maharashtra. Of these, 413 (65%) were male and 221(35%) were female.

Based on anatomical site affected, whole globe causes constituted majority of patients i.e 255 (40.22%) followed by lenticular (24.45%) and corneal causes (21.14%).[table 1]

Table 1: Classification Of Childhood Blindness Based On Anatomical Site Affected

Categories	Number	%
Whole Globe	265	41.80%
Corneal causes	124	19.56%
- Vitamin A deficiency	80	12.62%
- others	44	6.94%
Lenticular causes	155	24.45%
- Cataract	148	23.34%
- Pseudophakia/ Aphakia	7	1.11%
Retinal Causes (ROP, dystrophies, albinism etc)	38	5.99%
Optic atrophy	8	1.27%
Glaucoma	12	1.89%
Refractive errors +/- amblyopia	22	3.47%
Squint with amblyopia	10	1.57%

Causes of childhood blindness were also classified on the basis of Etiology, depending upon the time of insult leading to blindness and is summarized in table 2. Hereditary factors were around 6.78%, Intrauterine 0.16%, perinatal 4.89%, Post Natal 17.66% and for majority the underlying factor leading to the condition causing blindness could not be determined (70.5%).[table 2]

Table 2: Classification Of Childhood Blindness Based On Etiology

Category	No. of cases	Percentage
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Hereditary:		
- AR	8	1.26%
- AD	13	2.05%
- others	22	3.47%
Intrauterine		
- Rubella	1	0.16%
Perinatal/ Neonatal		
- ROP	17	2.68%
- others	12	1.89%
Postnatal Childhood:		
- Vitamin A deficiency	80	12.62%
- Trauma	8	1.26%
- others	16	2.53%
Undetermined:		
- Cataract	153	24.13%
- Glaucoma	12	1.89%
- Abnormality since birth	265	41.80%
- others	27	4.26%
Total	634	

119 (18.76%) patients had potentially preventable causes of blindness and is summarized in table 3. Vitamin A deficiency was the leading cause of avoidable blindness in this study (13.25%).[table 3]

Table 3 – Preventable Causes Of Blindness

Category	Number of patients	%
Vitamin A deficiency	80	13.25%
Ocular Injuries	8	1.26%
Rubella	1	0.15%
others	26	4.1%

177 (27.92%) children had treatable causes of childhood blindness, Cataract being the major cause constituting around 23.24%.

Overall, 46.68% cases of childhood blindness in this study were either preventable or treatable.

DISCUSSION

In India, there are very few population-based surveys for childhood blindness. As the prevalence of blindness in children is much lower than in adults, a larger sample size of children is needed to provide accurate data on childhood blindness. In this study we have tried to screen all children visiting the hospital as well as school health camps were conducted to obtain maximum possible data in this area.

There was a preponderance of boys (65%), which is similar to other studies in developing countries due to various cultural and economic constraints which can lead to sex discrimination.

In our study, Whole globe causes constituted maximum cases of childhood blindness. This has been a common finding in many other childhood blindness studies in India.⁶⁻¹¹ However the underlying causes of whole globe abnormality are not known as most cases are sporadic. Of monogenic causes only SOX2 has been identified as a major causative gene. Other linked genes include PAX6, OTX2, CHX10 and RAX. SOX2 and PAX6 mutations may act through causing lens induction failure.¹² One hypothesis is that micropthalmos, anophthalmos and coloboma are due to interactions between genes controlling retinoic acid signalling and maternal vitamin A deficiency during early fetal development, this may explain its prevalence in Indian Children.¹³

There has been a considerable decrease in preventable/treatable causes of blindness over the years with a shift towards non- treatable causes due to development in health care facility and awareness (table 4).^{6-8,14-17}

Table 4: Change In Pattern Of Childhood Blindness Over Years

	Rahi et al (1995)	Titi-yal et al (2003)	Go-gate p et al (2007)	Harsha batta-charjee Et al (2008)	S. Krishn aiah et al (2009)	S A bhal-erai et al (2015)	Khem -annu et al (2016)	Pre-sent study
Whole globe	20.7%	27.4%	41.3%	36.1%	41.4%	34.44%	16.7%	41.8%
Cornea	26.4%	21.7%	22.2%	36.4%	8.1%	24.4%	-	19.5%
lens	12.3%	10.9%	6%	10.9%	9.9%	10%	27.8%	24.45%

Retina	20.7%	15.1%	11.2%	5.8%	18.6%	3.3%	44.4%	5.99%
Glaucoma	2.6%	4.9%	-	-	-	-	-	1.89%

Despite the development of health care facilities, almost half (46.68%) of the study population had either preventable or treatable causes of blindness.

CONCLUSION

A paradigm shift in causes of childhood blindness has been observed over years due to development of various health care facilities however there's still a long way to go to reduce overall burden of childhood blindness especially in rural areas.

A comprehensive eye care approach involving gamut of health promotion, disease prevention, diagnosis, treatment and rehabilitation addressing the full spectrum of eye disease coordinated across and integrated within the community, primary, secondary and tertiary levels within and beyond the health sector is needed.

Financial Support and Sponsorship: None

Conflicts of Interest: None

REFERENCES

- Rahi JS, Gilbert CE, Foster A, Minassian D. Measuring the burden of childhood blindness. *Br J Ophthalmol*. 1999 Apr;83(4):387-388.
- World Health Organization. Preventing blindness in children: report of WHO/IAPB scientific meeting. Programme for the Prevention of Blindness and Deafness, and International Agency for Prevention of Blindness. Geneva: WHO, 2000 (WHO/PBL/00.77).
- Gilbert CE, Anderton L, Dandona L, et al. Prevalence of visual impairment in children: a review of the available data. *Ophthalmic Epidemiol* 1999;6:73-82.
- Dandona L, Gilbert CE, Rahi JS, et al. Planning to reduce childhood blindness in India. *Indian J Ophthalmol* 1998;46:117-22.
- Gilbert C, Foster A, Négrel AD, Thylefors B. Childhood blindness: a new form for recording causes of visual loss in children. *Bull World Health Organ*. 1993;71(5):485-9. PMID: 8261552; PMCID: PMC2393473.
- Rahi JS, Sripathi S, Gilbert CE, Foster A. Childhood blindness in India: Causes in 1318 blind school studies in nine states *Eye*. 1995;9:545-50
- Titilal JS, Pal N, Murthy GV, et al. Causes and temporal trends of blindness and severe visual impairment in children in schools for the blind in North India. *Br J Ophthalmol*. 2003;87(8):941-945. doi:10.1136/bjo.87.8.941
- Gogate, P, Deshpande, M. , Sudrik, S. , Taras, S. , Kishore, H. & Gilbert, C. (2007). Changing pattern of childhood blindness in Maharashtra, India. *BRITISH JOURNAL OF OPHTHALMOLOGY*, 91(1), 8-12.
- Hornby SJ, Adolph S, Gothwal VK, et al. Evaluation children in six blind schools in Andhra Pradesh. *Ind J Ophthalmol* 2000;48:195-200.
- SilAK, Gilbert CE. Childhood blindness in India. *J Ind Med Assoc* 2001;99:10-15.
- Das R, Bhattacharjya H, Roy DB. Childhood blindness and associated factors: An observational study at the district disability rehabilitation centre, West Tripura district, India. *J Family Med Prim Care*. 2021 Dec;10(12):4497-4501. doi: 10.4103/jfmpc.jfmpc_273_21. Epub 2021 Dec 27. PMID: 35280625; PMCID: PMC8884323.
- Verma AS, Fitzpatrick DR. Anophthalmia and micropthalmia. *Orphanet J Rare Dis*. 2007 Nov 26;2:47. doi: 10.1186/1750-1172-2-47. PMID: 18039390; PMCID: PMC2246098.
- Hornby S, Ward SJ, Gilbert CE. Eye birth defects in humans may be caused by recessively inherited genetic predisposition to the effects of maternal vitamin A deficiency during pregnancy. *Med Sci Monitor* 2003;9:HY23-26
- Bhattacharjee H, Das K, Borah RR, Guha K, Gogate P, Purukayastha S, Gilbert C. Causes of childhood blindness in the northeastern states of India. *Indian J Ophthalmol*. 2008 Nov-Dec;56(6):495-9.
- Krishnaiah S, Subba Rao B, Lakshmi Narasamma K, Amit G. A survey of severe visual impairment in children attending schools for the blind in a coastal district of Andhra Pradesh in South India. *Eye (Lond)*. 2012 Aug;26(8):1065-70. doi: 10.1038/eye.2012.88. Epub 2012 May 11. PMID: 22576826; PMCID: PMC3420058.
- Bhalerao SA, Tandon M, Singh S, Dwivedi S, Kumar S, Rana J. Visual impairment and blindness among the students of blind schools in Allahabad and its vicinity: A causal assessment. *Indian J Ophthalmol*. 2015 Mar;63(3):254-8. doi: 10.4103/0301-4738.156930. PMID: 25971172; PMCID: PMC4448240.
- Kemmanu V, Hegde K, Giliyar SK, Shetty BK, Kumaramanickavel G, McCarty CA. Prevalence of Childhood Blindness and Ocular Morbidity in a Rural Pediatric Population in Southern India: The Pavagada Pediatric Eye Disease Study-1. *Ophthalmic Epidemiol*. 2016 Jun;23(3):185-92.