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A STUDY OF ANATOMICAL CAUSES OF BLINDNESS IN CHILDREN FROM WESTERN RAJASTHAN

Ophthalmology

Dr Avisha Mathur Resident, Department of Ophthalmology, MDM hospital, Dr. S. N. Medical College, Jodhpur

Dr Arvind Chauhan Professor & head, Department of Ophthalmology, MDM hospital, Dr. S. N. Medical College, Jodhpur

ABSTRACT

Introduction: Childhood blindness refers to a group of diseases and conditions occurring in childhood or early adolescence (<16 years of age), which, if left untreated, result in blindness or severe visual impairment that are likely to be untreatable later in life. Childhood blindness could be grouped according to the anatomical structure affected into different groups.

Material and methods: This study was done at MDM hospital Jodhpur in Department of Ophthalmology from Jan 2015 to June 2016 and children less than 16 years of age attending OPD of MDM hospital and blind schools within and near Jodhpur with blindness or severe visual impairment were enrolled. The part of the eye which had been damaged and leading to visual loss is identified (such as cornea, lens, retina, optic nerve, whole globe). Where two or more anatomical sites were involved the major site was selected, or where two sites contributed equally, the most treatable condition was selected.

Results: In our study the major site of abnormality causing blindness was lens in 84(29.58%) patients followed by whole globe in 78(27.47%) of patients. Third most common site of abnormality was optic nerve in 51(17.96%) patients. Cornea, retina and uvea were the major site of abnormality in 26(9.16%), 25(8.80%) and 9(3.17%) patients respectively. We found that main cause of blindness was cataract/pseudoaphakia in 80(28.17%) patients followed by optic nerve atrophy in 48(16.9%) patients. Other important causes of blindness were anophthalmos and microphthalmos in 23(8.1%) and 22(7.75%) cases respectively. Retinal dystrophy was cause of blindness in 18(6.34%) patients followed by corneal opacity in 13(4.58%) patients.

Conclusions: The major site of abnormality causing blindness was lens in 84(29.58%) patients followed by whole globe in 78(27.47%) of patients. Third most common site of abnormality was optic nerve in 51(17.96%) patients. We found that main cause of blindness was cataract/pseudoaphakia in 80(28.17%) patients followed by optic nerve atrophy in 48(16.9%) patients.

KEYWORDS:

Childhood blindness, Severe visual impairment

INTRODUCTION

Childhood blindness refers to a group of diseases and conditions occurring in childhood or early adolescence (<16 years of age), which, if left untreated, result in blindness or severe visual impairment that are likely to be untreatable later in life.1 Blindness in children can be defined as a visual acuity of <3/60 in the eye with better vision or central visual field each eye < 10 degree in a child under 16 years of age.2 This generally means that the child cannot see something three feet (about one meter) away, that another child could see if it was 60 feet (about 20 meters) away.[3]

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 populations varies from approximately 600 in affluent countries to approximately 6000 in very poor communities.[2]

Visual disabilities in children are more complex compared to those in adults. Although blindness in children is relatively uncommon, this age group is also considered a priority as severe visual loss in children can affect their development, mobility, education, and employment opportunities. Without visual stimulus, the child's overall development suffers. In addition to the disabled child, his/her family and the society at large are also negatively affected.

This indicates a need to attempt effective control of childhood blindness .Information about the major causes of blindness in children is required to design effective Prevention of Blindness (PBL) Programs.[4]

The prevalence of blindness in children ranges from approximately 0.3/1000 children in developed regions to 1.5/1000 in under developed regions.2 It is estimated that there are 1.4 million blind children in the world, out of which two thirds live in the developing countries, and that the causes of blindness in children vary according to region and socioeconomic development.[2]

Childhood blindness could be grouped according to the anatomical structure affected or by the principal cause of visual disability.5 According to WHO causes of childhood blindness is grouped according to anatomical structure involved in following groups:

1. Whole globe (e.g. anophthalmos, microphthalmos)
2. Cornea (e.g. corneal scarring, keratoconus)
3. Lens (e.g. cataract, aphakia)
4. Uvea (e.g. aniridia)
5. Retina (e.g. retinal dystrophies)
6. Optic nerve (e.g. atrophy)
7. Glaucoma
8. Conditions where the eye appears normal (e.g. refractive errors, cortical blindness, amblyopia)

MATERIAL & METHODS

This study was done at MDM hospital Jodhpur in Department of Ophthalmology from Jan 2015 to June 2016 and children less than 16 years of age attending OPD of MDM hospital and blind schools within and near Jodhpur with blindness or severe visual impairment were enrolled.

Blindness is defined as presenting visual acuity in the better eye of less than 0.05 (3/60; 10/200), and severe visual impairment as presenting visual acuity in better eye of less than 0.1 (6/60; 20/200) to 0.05 (3/60; 10/200) “functional” low vision as presenting visual acuity in the better eye of less than 0.3 (6/18; 20/60) to light perception.

The relevant information was collected from the class teachers and parents (whenever possible). Brief demographic details, medical and family history of each child were recorded.

Detailed eye examination of each child was conducted. Visual acuity was assessed in each eye using a Snellen tumbling E visual acuity test chart. The child who did not cooperate with the E chart, were assessed for the ability to percept and follow light. The visual status of children was recorded using WHO categories of visual impairment before and after refraction. To categorize a child under low visual category, simple

tests of functional vision were used. They were, the ability to navigate around two chairs set two meters apart unaided with a visual acuity of <20/60 to light perception and to recognize faces at a distance of three meters.

Anterior segments of the eye were examined using a light and/or with slit-lamp. The posterior segment was examined using direct and indirect ophthalmoscope after dilatation of pupil. Information or observation are recorded in standard form, WHO/PBL Eye Examination Record for Children with Blindness and Low Vision, according to the Coding Instructions provided by WHO for the same.3 The part of the eye which had been damaged and leading to visual loss is identified (such as cornea, lens, retina, optic nerve, whole globe). Where two or more anatomical sites were involved the major site was selected, or where two sites contributed equally, the most treatable condition was selected.

Appropriate statistical tools and technique were applied as per data collection.

Inclusion criteria:

1. Children aged 0 to 15 years.
2. Child with best corrected visual acuity of <6/60 i.e. equal to 6 m finger count.

Exclusion criteria:

1. Children who have low vision and best corrected visual acuity >6/60 in better eye are excluded from this study.
2. Children with uniocular blindness.
3. Parents/ guardians refused for consent

RESULTS

Table 1

Age (at the onset of visual loss) and sex wise distribution of blind children

Time of visual loss	Males (%)	Female (%)	Total (%)
Since birth (Hereditary/Intrauterine)	164(57.75%)	62(21.83%)	226(79.58%)
First year of life (Perinatal/New born/Infancy)	05(01.76%)	02(00.70%)	07(02.46%)
1 – 15 year (Childhood)	28(09.86%)	12(04.23%)	40(14.08%)
Unknown/Undetermined	08(02.82%)	03(01.06%)	11(03.87%)
Total	205(72.18%)	79(27.82%)	284(100%)

Table 2

Blind school Vs Outdoor patients

	Males (%)	Females (%)	Total (%)
From Blind School	47(16.55%)	09(03.17%)	56(19.72%)
Hospital OPD Patients	158(55.63%)	70(24.65%)	228(80.28%)
Total	205(72.18%)	79(27.82%)	284(100%)

Table 3

Rural Vs Urban patients

	Males (%)	Females (%)	Total (%)
Rural	93(32.75%)	26(09.15%)	119(41.90%)
Urban	112(39.44%)	53(18.66%)	165(58.10%)
Total	205(72.18%)	79(27.82%)	284(100%)

Table 4

Anatomical classification of the causes of blindness

Structure involved	Males (%)	Females (%)	Total (%)
Whole globe	61(21.48%)	17(05.99%)	78(27.47%)
Cornea	13(04.58%)	13(04.58%)	26(09.16%)
Lens	63(22.18%)	21(07.39%)	84(29.58%)
Uvea	06(02.11%)	03(01.06%)	09(03.17%)
Retina	22(07.75%)	03(01.06%)	25(08.80%)
Optic nerve	31(10.92%)	20(07.04%)	51(17.96%)
Others	09(03.17%)	02(00.70%)	11(03.87%)
Total	205(72.18%)	79(27.82%)	284(100%)

Table 5

Main cause of blindness

Cause of blindness	Males (%)	Females (%)	Total (%)
Whole globe	61(21.48%)	17(05.99%)	78(27.46%)
a. Phthisis	09(03.17%)	02(00.70%)	11(03.87%)
b. Anophthalmos	19(06.69%)	04(01.41%)	23(08.10%)
c. Microphthalmos	19(06.69%)	03(01.06%)	22(07.75%)
d. Buphthalmos	06(02.11%)	05(01.76%)	11(03.87%)
e. Secondary glaucoma	08(02.82%)	03(01.06%)	11(03.87%)
f. Removed	00	00	00
g. Disorganised	00	00	00
h. Others	00	00	00
Cornea	14(04.93%)	13(04.58%)	27(09.51%)
a. Staphyloma	02(00.70%)	03(01.06%)	05(01.76%)
b. Scar	01(00.35%)	01(00.35%)	02(00.70%)
c. Keratoconus	03(01.06%)	03(01.06%)	06(02.11%)
d. Dystrophy	00	01(00.35%)	01(00.35%)
e. Other opacity	08(02.82%)	05(01.76%)	13(04.58%)
Lens	62(21.83%)	21(07.39%)	83(29.23%)
a. Cataract/Pseudoaphakia	59(20.77%)	21(07.39%)	80(28.17%)
b. Aphakia	03(01.06%)	00	03(01.06%)
c. Others	00	00	00
Uvea	06(02.11%)	03(01.06%)	09(03.17%)
a. Aniridia	01(00.35%)	00	01(00.35%)
b. Coloboma	03(01.06%)	01(00.35%)	04(01.41%)
c. Uveitis	02(00.70%)	02(00.70%)	04(01.41%)
d. Others	00	00	00
Retina	22(07.75%)	03(01.06%)	25(08.80%)
a. Dystrophy	16(05.63%)	02(00.70%)	18(06.34%)
b. Albinism	02(00.70%)	01(00.35%)	03(01.06%)
c. ROP	02(00.70%)	00	02(00.70%)
d. Retinoblastoma	00	00	00
e. Others(RD)	02(00.70%)	00	02(00.70%)
Optic nerve	31(10.92%)	20(07.04%	51(17.96%)
a. Atrophy	29(10.21%)	19(06.69%)	48(16.90%)
b. Hypoplasia	02(00.70%)	01(00.35%)	03(01.06%)
c. Others	00	00	00
Globe appears normal	09(03.17%0	02(00.70%)	11(03.87%)
a. Refractive error	03(01.06%)	01(00.35%)	04(01.41%)
b. Amblyopia	01(00.35%)	01(00.35%)	02(00.70%)

c. Cortical blindness	02(00.70%)	00	02(00.70%)
d. Idiopathic nystagmus	01(00.35%)	00	01(00.35%)
e. Others(PPHV)	02(00.70%)	00	02(00.70%)
Total	205(72.18%)	79(27.82%)	284(100%)

DISCUSSION

In our study out of total 284 enrolled patients 205(72.18%) patients were males and 79(27.82%) patients were females. This difference is probably due to the greater value accorded to male children in this part of the countryand visit hospitals and blind schools to seek medical treatment or rehabilitate them.

In our study 226(79.58%) patients were blind since birth due to hereditary or intrauterine factors, 7(2.46%) patients developed blindness in first year of life and 40(14.08%) patients developed blindness in between 1-15 years of age. We were not able to determine exact time of onset of blindness in 11(3.87%) patients.

Out of total enrolled patients 228(80.28%) patients were enrolled from the patients visiting outdoor of MDM hospital. Rest 56(19.72%) patients were enrolled from blind schools present in vicinity of Jodhpur. Out of total enrolled patients 119(41.90%) patients were residents of rural areas of western Rajasthan. Rest 165(58.10%) patients were residents of urban areas.

It is estimated that in developing countries, only 10% of the blind children attend blind schools.6 Ignorance of parents and geographical inaccessibility to the schools are major factors among those residing in remote and poor areas. A culture of mistrust and scepticism exists in some tribal and village communities regarding such centers, which further hinders access.[7]

The World Health Organization (WHO) classifies the causes of childhood blindness according to the anatomical site most affected and the underlying etiology.[8]

In our study the major site of abnormality causing blindness was lens in 84(29.58%) patients followed by whole globe in 78(27.47%) of patients. Third most common site of abnormality was optic nerve in 51(17.96%) patients. Cornea, retina and uvea were the major site of abnormality in 26(9.16%), 25(8.80%) and 9(3.17%) patients respectively.

In a study conducted by Sia et al (2010) in 4 blind schools of Combodia found that the major anatomical site of blindness and severe visual impairment was the lens in 27.4%, cornea in 25.8%, retina in 21% and whole globe in 17.7% of patients.[9]

Sitorus et al (2007) conducted a study in Java in blind school on 479 students and found that major anatomical site of blindness and severe visual impairment was whole globe in 35.9%, retina in 18.9%, lens in 16.4% and cornea in 16.1% of patients.[10]

We found that main cause of blindness was cataract/pseudophakia in 80(28.17%) patients followed by optic nerve atrophy in 48(16.9%) patients. Other important causes of blindness were anophthalmos and microphthalmos in 23(8.1%) and 22(7.75%) cases respectively. Retinal dystrophy was cause of blindness in 18(6.34%) patients followed by corneal opacity in 13(4.58%) patients. Phthisis bulbi, buphthalmos and glaucoma each was causing blindness in 11(3.87%) patients.

Keratoconus was causing blindness in 6(2.11%) patients and staphyloma was causing blindness in 5(1.76%) patients. Refractive error (high myopia), uveitis and iris coloboma each was causing blindness in 4(1.41%) patients.

Hypolplasia of optic nerve, albinism and aphakia each was causing blindness in 3(1.06%) patients. Other causes of blindness were corneal scar, ROP, retinal detachment, amblyopia, cortical blindness and PPHV each in 2(0.70%) patients. Corneal dystrophy, aniridia and idiopathic nystagmus each was causing blindness each in 1(0.35%) patients.

According to the study conducted in Allahabad and its vicinity by Bhaerao et al (2015), a total of 90 students were examined in four blind schools in Allahabad and its vicinity. They found that main causes of severe visual impairment and blindness in the better eye of students were microphthalmos (34.44%), corneal scar (22.23%), anophthalmos (14.45%), pseudophakia (6.67%), optic nerve atrophy (6.67%), buphthalmos/glaucoma (3.33%), cryptophthalmos (2.22%), staphyloma (2.22%), cataract (2.22%), retinal dystrophy (2.22%), aphakia (1.11%), coloboma (1.11%), retinal detachment (1.11%), etc.11

CONCLUSION

In our study the major site of abnormality causing blindness was lens in 84(29.58%) patients followed by whole globe in 78(27.47%) of patients. Third most common site of abnormality was optic nerve in 51(17.96%) patients. In our study main cause of blindness was congenital cataract/ pseudophakia in 80(28.17%) patients followed by optic nerve atrophy in 48(16.9%), anophthalmos in 23(8.1%), microphthalmos in 22(7.75%), retinal dystrophy in 18(6.34%) and corneal opacity in 13(4.58%) patients.

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