



Original Research Article

Childhood blindness - Etiological risk factors as evaluated by blind schools survey in Prayagraj and surrounding districts

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ARTICLE INFO

Article history:

Received 19-07-2019

Accepted 09-09-2019

Available online 27-11-2019

Keywords:

Severe visual impairment

Microphthalmos

Anophthalmos

Buphthalmos

ABSTRACT

Aim: The purpose of our study is to examine and evaluate avoidable i.e. preventable or treatable causes and etiological risk factors responsible for childhood blindness.

Materials and Methods: The study was conducted by examining total 159 Students in four schools for blinds and four accelerated learning camps situated in Prayagraj and three neighbouring districts - Fatehpur, Koushambi and Pratapgarh. Basic informations including time, duration and mode of vision loss, was obtained. Careful prenatal, natal and postnatal history was also gathered. Vision assessment was done by snellen's, Echarts or broken rings, student's behaviour while walking, talking, moving head etc. Anterior segment and fundus examination was also done. We tried to evaluate causes and it aetiologicial risk factors responsible for childhood blindness in every blind student.

Results: In about 80% of blind children cause was, microphthalmos, Anophthalmos, Buphthalmos, Corneal Conditions as staphyloma or scarring, uveal coloboma. Although R.O.P., R.D. and optic nerve diseases also contributed. Four students were not requiring admission, yet admitted. Specialized teachers were not available.

Conclusion: Approximately 80% of childhood blindness may be avoidable i.e. preventable or treatable. Meticulous prenatal, natal and post natal care as avoiding medicines and x-rays during Ist trimesters, harmful traditional medications, nutritional & anti infective measures, safe delivery and effective immunization may reduce childhood blindness considerably.

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1. Introduction

Blindness specially in children is a global problem which markedly influences social and mental development of a child. Approximately 30% of India's blind loose their eye sight before the age of 20 years and many of them are under five years when they become blind.¹ Child hood blindness, thus should be a priority area for any nation because a child has to live with blindness for quite a long time. Children born and brought up in developing countries are more prone to blindness as compared to developed nations. Incidentally almost half of all blindness in children in the developing

countries of Africa and Asia are due to avoidable causes which are poorly managed specially at primary eye care level.

Thus obviously we require meticulous data for effective planning and monitoring the out come of preventive and curative services for children including planning special health education and low vision services.

The causes of blindness and their risk factors exhibits changing scenario with time due to improved health facilities by trained and specialized medical personnel. Previously the most common cause for blindness was ocular and other infections. Most of them were treated by harmful traditional medications with sequelae. It has been observed that due to improvement of health and socio-economic status, nutritional and infective causes

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of blindness shows declining trend while hereditary and congenital factors have become the major causes in children. There is appreciable regional variation in causes of blindness usually nutritional and infective causes in developing while in developed country lesions of CNS predominate. In middle income group countries picture is mixed with Retinopathy of prematurity emerging as an important treatable cause of blindness. Globally cataract, retinal diseases, and congenital abnormalities affecting whole globe are important cause of blindness.

Although various studies have been done in blind schools to know the prevalence of avoidable causes of congenital and acquired blindness but a glimpse of variations and incoherence is always there. More or less some authors are of clear cut opinion about changing scenario of cause of blindness. Use of Teratogenic medications along with X-Ray and other exposures during pregnancy is still prevailing, specially in rural areas due to lack of qualified gynecologists and pediatricians. Surprisingly sometimes with a appropriate optical or surgical interventions many children improved their vision so much so that they can do their major tasks comfortably yet admitted in blind schools. Thus this retrospective study is done to evaluate the avoidable cause of childhood blindness, Ocular morbidity status and identify etiologies that triggered blindness in children of various blind schools in Prayagraj and its neighbouring districts of Prayagraj namely, Fatehpur, Koushambi and Pratapgarh.

Infact we find that study in these blind schools is not a real estimate of magnitude of childhood blindness as they represent only a very small proportion of total blindness in the society in comparison to population based study. Blind Children from rural area, low socio-economic group, with associated disability are usually under represented. But since population based survey requires larger sample size and are very costly so in Indians cenario most of the statistics usually comes from blind school survey.

2. Materials and Methods

The study was conducted in f our School for the blinds in Prayagraj and in the four accelerated learning camps situated in three neighbouring districts namely Fatehpur, Koushambi and Pratapgarh. In cross sectional study total 159 students were examined. List of these blind schools and accelerated learning camps was obtained from District Magistrate office of corresponding districts. An examination date was fixed separately for each blind school and accelerated camp in consultation with principal of the school. Parents of children were also called on the same date just to obtain history, income and various incidents and happenings responsible for blindness to extract out etiological risk factors.

The study included all the students of blind school irrespective of their age. Basic informations were gathered from student himself, class teacher and parents (wherever

possible), by reviewing school official and medical records of student. A meticulous history pertaining to time, duration and mode of vision loss was obtained. Careful prenatal, natal and post natal history was obtained. Any fever, acute illness, harmful medications, X-ray exposure during pregnancy was en quired. During childhood h/o diarrhoea, measles, trauma, infections in eye was also noted. Family history specially about involvement of other member in family, Consanguineous marriage also recorded. Additional disability like mental retardation, epilepsy, hearing problems and any other were recorded.



Fig. 1:

An ophthalmologist and an ophthalmic assistant examined the children at school premises. Vision assessment was done using snellen's illiterate E chart or broken rings. If vision was less then 3/60, each eye was tested for ability to perceive light. Pinhole examination was carried out and those who improved were subjected under proper cycloplegic refraction. Student who failed to co-operate with these traditional tests were watched by their behaviour while walking, talking, moving head etc. Anterior segment examination was done with torchlight, simple magnifying loupe (x 2.5). Fundus was examined (in appropriate case) by direct ophthalmoscopy (Indirect ophthalmoscopy if required) after fully dilating the pupil.

The a natomical cause of visual loss i.e blindness / SVI was assessed by clinical examination. We tried to

ascertain most probable aetiological risk factors responsible for blindness / SVI with the help of clinical evaluation, history by child himself/herself or sometimes by making relevant enquires by parents of child. In spite of our best efforts in some children exact aetiological risk factors could not be ascertained. A list of students requiring any sort of therapeutic intervention (optical, medical or surgical) was prepared in duplicate. These students were either called to our R.I.O or related to nearby secondary/ tertiary ophthalmic institution. One list of these students was handed over to principal of school and a fixed day/date was told for further examination and management at our R.I.O.

Data collected was entered into an IBF compatible computer, from where frequency charts and distributions were generated. The cause of SVI/BL were documented.

The study was conducted in total 159 students of four school of the blind in Prayagraj and in four accelerated learning camps of three neighboring districts of Prayagraj.

4. 143 (approximately 90%) students were blind as per proposed criteria by WHO in 1972 with visual acuity < 3/60 by snellen's or its equivalent. (Table 4)
5. 4(2.51%) students were having visual accuity 6/18 or better hence not requiring admission. (Table 4)
6. Approximately 80 students were blind due to whole globe (Microphthalmos, Anophthalmos, Bupthalmos) plus corneal (staphyloma, scarring etc) abnormalities. (Table 5)

Majority of causes of blindness among blind school children were avoidable i.e. preventable or treatable. Meticulous antenatal, natal and postnatal care, genetic studies, avoiding use of harmful traditional medications, nutritional care, anti infective and effective immunization measures may reduces incidence of childhood blindness considerably.

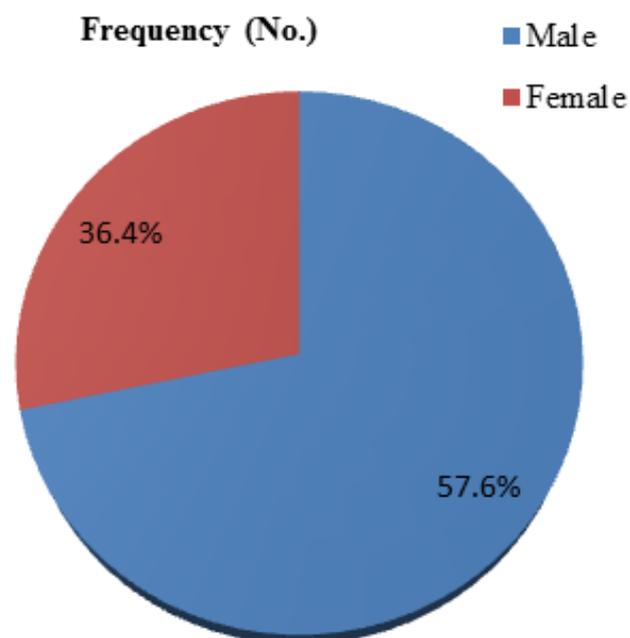
4. Discussion

WHO in 1972 proposed a uniform criteria to define blindness as visual acuity less than 3/60 (snellen) or its equivalent. In order to ensure the screening of students by less specialized person and that too with less co-operation, in the absence of appropriate vision charts, the WHO in 1979 added the "inability to count fingers in a day light at a distance of 3 meters" to indicate vision less than 3/60 or its equivalent.

It is very difficult to obtain prevalence of blindness in children as it is not possible to have desired sample size in a population based survey for blindness in children. More or less usually blind schools do not admit children below 5 years of age and children with multiple disabilities. Apart from this, villagers specially from poor community may not having proper information about blind schools. Thus representation from every sphere may not be uniform. However we tried to achieve some clue about blindness and its causes from examining blind children in blind schools.

It has already been observed that in developing countries only 10% of the blind children attend blind school. So as in our previous study we did not focus much upon exact incidence of blindness in children. We tried to examine and analyze various causes of blindness and their aetiological risk factors in this study. Blindness in children is not as common as blindness in adults. Still most causes of blindness in children is either preventable or treatable. More or less timely appropriate interventions against various risk factors as belonging to nutrition, infections, antenatal, natal and postnatal care, immunization, may be avoided.

We found that out of 159 students 78.61% (125 students) were admitted from rural back ground in various blind schools. This does not mean that awareness for admission in blind school is more in rural area. Aetiological risk factors causing childhood blindness are more prevalent in rural area as poverty, lack of education, infections, and less awareness to avail opportunities of government and



Graph 1: Distribution of students in blind schools by gender (in percentage)

3. Results

1. There was male ponderance (57.6%) as compared to female students (Table 1)
2. Number of students from rural background (125-78.6%) was significantly higher as compare to urban background. (Table 2)
3. 99(62.22%) students were belonging to lower socio-economic income group i.e. class 4 and 5 as per modified B.J. Prasad classification. (Table 3)

Table 1: Number of students examined in each blind school is as follows.

Name of School	Total No. of Student	Male	Female
Accelerated Learning Camp in Prayagraj.	38	18	20
Accelerated Learning Camp in Fatehpur.	30	20	10
Accelerated Learning Camp in Kaushambi.	17	8	9
Accelerated Learning Camp in Pratapgarh.	5	3	2
Raj Andh Vidyalaya, Prayagraj.	33	18	15
Arunima Blind School, Prayagraj.	21	12	9
The School and home for the blind, Naini Prayagraj.	10	9	1
Bachpan Day Care Center, S.R.N. Hospital Road, Prayagraj.	5	3	2
	159	91	68
		57.6%	36.4%

Table 2: Distribution of students in blind schools by area of residence (Urban or Rural)

	No. of Students	%
Urban	34	21.38
Rural	125	78.61
Total	159	100

Table 3: Distribution of students in blind schools by socio economic status according to modified B.J, Prasad Classification:-

Class	Per capita per month income	No. of Students	%
I	5156 and above	12	7.54
II	2578 to 5155	27	16.98
III	1547 to 2577	21	13.33
IV	773 to 1546	46	28.93
V	Below 773	53	33.33
Total		159	100

Table 4: Visual Acuity in better eye in blind school students

WHO Visual Category	VISION (Better eye)	No. of Students	Percentage
Blind	PL-VE (NPL)	34	21.38
Blind	<3/60-PL	110	69.18
SVI	<6/60-3/60	11	6.91
VI	<6/18-6/60	0	0
No impairment	6/18 or better	4	2.51
Total		159	100

Table 5: The main course of Blindness and Severe visual impairment in better eye among blind school students.

Anatomical site	No.	Percentage (%)	Causes	No.	Percentage (%)
Whole globe	83	54.44	Microphthalmos	55	34.59
			Anophthalmos	23	14.46
			Buphthalmos/Glaucoma**	5	3.14
			Others (Cryptophthalmos etc)	4	2.51
Corea	43	24.45	Staphyloma*	3	1.88
			Corneal Scar*	35	22.01
			Others	0	0
Uvea	1	1.11	Coloboma	2	1.25
Retina	3	3.33	Others	0	0
			Dystrophy	4	2.51
			Albinism	0	0
			Retinopathy of Prematurity**	0	0
Optic Nerve	6	6.67	others (Retinal Detachment etc.)	2	1.25
			Optic Nerve Atrophy	10	6.28
				159	100

*Preventable cause of blindness **Treatable cause of blindness.

social policies are some factors causing more blindness in rural area as compared to urban population. Of course, government is facilitating rehabilitation of rural blind children by opening accelerated learning centers in rural areas yet more emphasis is required for health education and awareness programmes to prevailing government programmes regarding prevention of various nutritional and infective diseases. Unfortunately the present study clearly reveals that in developing nations blindness occurring in preschool age group could have been prevented just by simple care at primary level. So preventive aspects at CHC level is required to be strengthened still more.

In our study majority of students, 90% were having visual acuity in the better eye to the level of critically defined blindness i.e. below 3/60. This parameter very strongly advocates incorporation of various facilities in blind schools as promoting training and education for blind children as upgradation of Braille system. Some of blind schools were not having trained teachers for this valuable technology. Government should intend to train and provide job opportunities for these children. Surprisingly 4(2.5%) students were having equal or more than 6/18 vision in better eye. These students may not require admission and would have continued their lives at home. We recommended a regular and meticulous examination by a board of specialist constituted by C.M.O. apart from at time of admission, parents of every student is required to submit a certificate of blindness or SVI as provided by this board at the time of admission. Apart from this there should be a provision of regular examination to assess visual status of every child and any student found to be having vision 6/18 or better must be encouraged to hire and grow at home with parents which definitely provide much better environment.

The chief concern of present study is to discuss about avoidable i.e. preventable and treatable causes of blindness. Approximately two third students were blind due to diseases which could have either been prevented or treated by specific specialist.

Approximately 25% of students were blind due to potentially preventable causes of blindness. Vitamin A deficiency, measles, trauma, use of harmful and teratogenic medication remedies and X-rays exposure and TORCH Infection. This clearly suggests importance of primary prevention as maternal and child health care, immunization, nutrition, control of endemic disease and good treatment of common conditions.

Cataract (10%), glaucoma (2.7%) and retinopathy of prematurity are among some treatable conditions. Congenital cataract and glaucoma are most important treatable causes of childhood blindness in blind schools. These diseases required early intervention by experienced ophthalmologist. There should be provision for long term follow up and management. Government should take all care to establish and promote pediatric ophthalmology unit

with experienced and trained ophthalmologists specially in north India. Children with ROP deserves special attention in well equipped neonatal intensive care. A super specialist having ample knowledge and experience in Retina and lens are to be posted to treat these children.

Presence of 4 students having vision better than 6/18 led us to think about regular check up and treatment of various conditions including proper refraction and provision of low vision services among students having aphakia, microphthalmos, coloboma, pathological myopia and other such condition requiring provision of spectacles and low vision aids. Vijay Lakshmi et al have also recommended that children with vision better than CF should undergo refraction and BCVA with appropriate correction in blind schools time to time.

We are of the opinion that in previous comparison corneal diseases (24.25%) declined as a cause of childhood blindness. Beyond doubt, safe water supply, improved nutrition, better awareness for infections and an effective expanded programme on immunization (EPI) may have resulted this. However Cornea is one of the most vital part of eye and should be taken care of for long term. Village level practitioners should be advised to institute Vit. A in children having long standing diarrhoea and measles. There should be no instillation of steroid drops in simple conjunctival and corneal infections in children as being done by some general practitioners and as directly provided by some medical store owners in villages. Government should take action time to time in villages so that medical store owners may not provide medicines directly to patients.

Although we could encounter visual status of every students meticulously as majority (156) of students in our study were having age, six years or above and they could easily responded by simple vision examination. However this may be drawback as health care facilities instituted 6-8 years prior to examination were of no use for analysis. These type of discussions require understanding of recent health care policies. Usually blind schools do not admit preschool children or those with multiple disabilities. So accurate blindness status in children is usually underestimated even by a most meticulous survey and some times we have to study upon a logical and rough estimates.

5. Conclusion

Conclusion of our study is that almost half of students were having blindness due to abnormalities (microphthalmos, anophthalmos, corneal dystrophy and coloboma etc.) present since birth. It becomes very difficult to obtain meticulous history to decide exact aetiological risk factor for these blinding diseases. However exposure to X - Rays, injudicious use of various medicines during antenatal period by family itself or quack or some genetic factors may have influences. Madgula (2009)⁸ also observed

41.3% blindness in children due to globe anomalies. Community health centre's specialists and city based medical associations are supposed to teach village level practitioners to avoid unnecessary exposure of X-rays and medicines during antenatal period. Otherwise specific attentions is needed to establish genetic studies at RIO level throughout country. Thus proper care of mother and foetus in ante natal period specially in Ist trimester, the time for or ganogenesis, is very essential. Safe delivery and meticulous postnatal care specially in neonatal period may prove to be an important factor in avoiding incidence of childhood blindness. Obviously this may be achieved by a combined, joint and sincere efforts by primary level worker, gynaecologist and pediatrician. Government should focus on proper training and monitoring of these specialists at every level.

6. Source of Funding

None.

7. Conflict of Interest

None.

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Cite this article: Srivastava MK, Kumar S, Kapoor S, Mishra SK. Childhood blindness - Etiological risk factors as evaluated by blind schools survey in Prayagraj and surrounding districts. *Indian J Clin Exp Ophthalmol* 2019;5(4):517-522.