Childhood Blindness

Background & Current situation

It is estimated that at least 200 000 to 300 000 children in India have severe visual impairment or blindness and approximately 15 000 are in schools for the blind. Although this represents a small percentage of the estimated 5 million blind in India, it is significant in terms of 'blind-years'. Childhood blindness and visual loss is important because of the impact on the child's development, education, future work opportunities & quality of life. This handicap ha s serious social & economic consequences on the family and the society. These negative effects are experienced throughout the child's life often lasting 50 or more years. Approximately 50 % of all childhood blindness in India is preventable or treatable. In order to develop a programme to control visual loss in children it is necessary to assess the need (magnitude and causes of visual loss) and the available resources, (particularly trained eye health workers and facilities).

Data on Childhood Blindness

There is very limited data on the prevalence and causes of childhood blindness, which is the basic requirement for developing strategies towards its prevention or management. One study conducted in various blind schools in 9 states report significantly different causes of blindness in different states on priority basis, for eg. Vitamin A deficiency contributes to 26.7% in Madhya Pradesh whereas it is only &7% in Kerala state. Whereas a population based survey in Andhra pradesh predicts only 5.5% are blind due to Vitamin A deficiency. Both the studies have their own limitations.

1. *Large population based study is needed to know the exact causes of blindness which is essential for planning the strategies towards the prevention of childhood blindness. This survey can be linked with other population-based activities like vaccination & child survival programmes.*
2. *The second possibility is maintaining an entry registry etiology all blind schools and children seeking Integrated Education at normal school by using the standardized WHO form recommended by ICEH, London.*

Etiology of Childhood Blindness

For easy understanding and developing strategies it can be classified either anatomically or the time of occurrence and type of the disease.

Table 1:

Causes of childhood blindness (V/A < 6/60)

Anatomical Cause	**India n= 1318**	**India Aravind n= 125**	**India Vellore n=24**	**India LVP, Hyderabad**
Cornea	26.0%	14.4%	25.0%	11.1%
Lens	12.0%	8.0%	33.0%	15.3%
Retina	21.0%	17.6%	12.0%	22.2%
Glaucoma	3.0%	5. 6%	12.0%	4.2%
Optic nerve	6.0%	12.8%	-	16.7%
Whole eye	25.0%	20.8%	18.0%	25.0%
Others	7.0%	20.8%	-	5.6%
Type of Survey	**Blind school children**	**Hospital based study**	**Hospital based study**	**Population based survey**

The available data indicate Vitamin A deficiency leading to Corneal scarring is a major preventable cause of childhood blindness but not in all areas of the region. Cataract in childhood is responsible for 10 – 20% of all cases in Blind schools and 15 – 35% of cases in Hospital studies. Retinal dystrophies from Autosomal recessive inheritance is responsible for 10 – 20 % of cases. Anophthalmus and Microphthalmos account for upto 20% of cases the causes are unknown.

Aetiology	India (%)
Genetic	23%
Intra -uterine	2%
Peri-natal	2%
Childhood	28%
Unknown	45%

Recommendations based on the etiology

Genetic causes

Genetic causes are responsible for atleast 25% of all causes of childhood blindness and possibly upto 50% in some societies./ The major diseases are inherited retinal dystrophies and familial cataract. The prevalence of consanguineous marriages contributes to the autosomal recessive disorders. *As a first step, a relevant strategy for the genetic eye disease would be the availability of guidelines to all ophthalmologists regarding advice to be given to the parents and patients with common inherited eye diseases. In order to create awareness of the importance of genetic eye diseases specialized genetic clinic should be developed in tertiary centers to give treatment apart from genetic counselling. Health education programmes to promote awareness of the increased risk from consanguineous marriages especially when there is a prevalence of particular disease may be helpful.*

Intra – Uterine infection

One of the studies conducted at Aravind estimates the **rubella virus infection** during the first trimester pregnancy be the cause for congenital cataract in atleast 25% of children. It is also possible that another 25% are missed since they are seen later in their life. This infection also known to cause microphthalmos, keratitis, glaucoma, retinopathy, apart from hearing defect and cardio vascular anomaly. *A wide range surveillance system will help in estimating the exact number of children affected by this virus, apart from looking at the birth registry with congenital anomalies. It is possible to prevent this disease by immunising all school going children or the vaccination can be provided by the government and made compulsory for all children at their early age (by 9 months) with the coverage atleast 80% to 90%.*

Peri - natal, Neo – natal

Infections like **Ophthalmia neonatorum** can be prevented by proper education to the health care professionals who are responsible for maternity and child health care.

Though **Retinopathy of prematurity** is not a major cause of blindness throughout the country at this stage, it is expected to be one of the reasonable contributor in another two decades since the quality of neonatal care and maternity care are increasing uniformly. To decrease the chances of this becoming a major cause of childhood blindness in India the following issues need to be addressed:

1. *Determine the survival rate of pre term and low birth weight babies.*

2. *Determine ROP screening guidelines according to gestational age and birth weight that are appropriate for India.*
3. *Increase awareness amongst Pediatricians, neonatologists, and ophthalmologists apart from training ophthalmologists to treat the disorders*.

Infancy / Childhood causes

Vitamin A deficiency

Corneal blindness due to Vitamin A deficiency is responsible atleast 1 quarter of childhood blindness in many areas of the region. In parts of south India *corneal xerophthalmia* is now being seen in the first 6 months of life probably reflecting inadequate maternal Vitamin A status. To obtain baseline population based data children aged 1-6 years can be examined for *Bitot's spot* and *corneal scar*. If the Bitot's spots are greater than 0.5% is considered as a public health problem. Control mechanisms for Vitamin A deficiency include:

1. *Control of precipitating diseases like measles and diarrhea, supplementation of high risk preschool children with Vitamin A, nutrition education to improve the vitamin A intake of women and preschool children, inclusion of micro nutrients in Government feeding programmes where appropriate.*
2. *Prophylaxis with Vitamin A can include to Pregnant women after 20 weeks of pregnancy, the mother at child birth, the children aged 6- 12 months and there after until 5 years.*

Uncorrected refractive errors

It is estimated that approximately 5% of school children have some degree of refractive error and atleast 0.5 –1% of children require spectacles greater than 1 diopter power. *Increasing parental and teachers awareness, by actual screening at schools, making the needed spectacles available to their children and their late follow ups should be the strategies.*

Severe visual impairment

Studies of children in blind schools and in integrated education have demonstrated atleast 60 % of the students have visual acuity in the range of 6/60 to PL of which approximately 80 % can be helped to read normal print with either distance spectacles and or magnifiers. To dispense the *low vision devices* to these children *it is essential for the country to produce indigenous low vision devices and the service facility should be made available in tertiary care centers.*

Congenital cataract

Between 10 –20% of admissions to blind school has cataract. The hospital studies indicate that 20 –25% of children are blind due to cataract. It is estimated that the incidence of bilateral cataract in childhood is at least 10 cases / million population / year. The major causes of bilateral cataract in childhood in South India are *rubella* 25%, *inherited* 25%, *unknown* 50%. Many children with bilateral cataract present late. *In order to improve the results of treatment it is necessary to develop the mechanism for examining all newborn babies for cataract and a good referral system to a Paediatric ophthalmologist in tertiary centers.*

Childhood Glaucoma

The incidence is estimated at 1 in 10000 live births that is 2-3 cases per million populations per year.

Retinoblastoma

The incidence is estimated to be 1- 3 cases / million population per year. The presentation is often late. To provide proper *treatment* for both these disorders children need to be *identified early* and *referred* to *paediatric ophthalmologist* who has experienced in this field.

Eye injuries

It is common cause of *unilateral blindness*. Boys are affected more than girls & the peak age is around 10 years. Prompt referral ands earlier impact of penetrating injuries impacts the visual outcome. *Public education* concerning the dangerous sharp objects and firecrackers is important to decrease incidence of eye trauma.

Human Resource Development

The programme should be integrated into the existing health care infrastructure, particularly the Primary Health Care Services especially Integrated Child Development Scheme (ICDS) and the National Prevention of Blindness Programme. This would allow utilization of existing eye power children who need ophthalmological attention. 1. The personnel involved in this programmes at the community level (like Child Development Project Officer, Supervisors, ANMs and Anganwadi workers in ICDS) should be given some basic training in detection of eye conditions that need to be referred and the basic fundamentals of eye health, stressing the importance of nutrition. 2. Educating the paramedical staff involved in maternal & child care at primary & secondary health centers. 3. The importance of cross referral between Paediatrician, obstratician, general practitioners & ophthalmologists. 4. Train adequate number of paediatric ophthalmologist in the country along with training paramedical staff especially Orthoptists and optometrists. This can be done by developing a structured training programmes at Institutions in India dealing with the large volume of childhood eye disorders.

Control of Childhood Blindness / Visual loss by Health Service Infrastructure

Services should be targeted at:

1. Neonates / infants (birth to 6 months)
2. Pre-school (6months to 5 years)
3. School children (5 to 15 years)

The services should be delivered:

1. As part of P.H.C. & ICDS at the community level
2. Integrated into a district eye care programme at the secondary level of care
3. At a specialized referral and training centre at the tertiary level

Conclusion

1. Epidermiology research for realistic needs assessment
2. Community based programmes to control Vitamin A deficiency & eye infections towards the prevention of childhood blindness
3. Basic treatment at PHC and District level hospitals
4. The provision of affordable spectacles for children with significant refractive errors
5. The development of tertiary centers to provide curative service
6. The provision of low vision services for children with a best corrected visual acuity of 6/24 – 1/60
7. Community based rehabilitation programmes and education to blind children
8. Promoting basic and clinical research in the field

Level	Neonates	Pre-school	School	Manpower	Resources
Primary: Community	Prophylaxis for Ophth. Neonatorum. Detection of Cataract, Glaucoma, Vitamin A for lactating mother.	Vitamin A for 6/12 – 5 years. Measles immunise. Identify Strabismus.	Screen for Refractive errors. Education to avoid eye injuries. Rubella immunisation for girls	Traditional .healers V/A chart T.B.A. Teachers MCH services Community	C.H.W. Vitamin A oc.tetracycline Torch
Secondary: Mid-level	Treat ophth. Neonatorum. Refer (or treat) Cataract, Glaucoma	Treat:- Ulcers Retinoblastoma Amblyopia Strabismus Injuries	Treat:- Refractive errors Injuries	Ophthalmologist Ophth. Assist Ophth. Nurse	Spectacles Medicines Clinic & surgical facilities
Tertiary: Referral	Treat:- ROP Cataract Glaucoma	Treat:- Cataract Glaucoma Corneal scar Amblyopia Injuries Retinoblastoma Provide:- Low vision services	Treat:- Injuries Corneal scar Provide:- Low vision services	Paediatric (oriented) Ophthalmologist Optometrist Orthoptist	Fully equipped tertiary centre Workshop to produce low vision devices