Research Paper

Volume : 4 | Issue : 7 | July 2015 • ISSN No 2277 - 8179

A Study to Evaluate the Causes of Blindness in Various Visual Disability Groups, at a Tertiary Care/Teaching Hospital, Krishna District, Andhrapradesh, India, Under Sadarem* Survey

Medical Science

KEYWORDS :

Dr.RajaKumar.Pasam	Asst. Professor of Ophthalmology, Siddartha Medical college, Vijayawada. AndhraPradesh, INDIA
Dr. VijayaSekhar. Kola	Associate.Professor of Ophthalmology SiddarthaMedical College, Vijayawada AndhraPradesh, INDIA
Dr.G.S.RameshKumar	Associate Professor of Ophthalmology SiddarthaMedical College, Vijayawada AndhraPradesh, INDIA
Dr.V.M.V.R.V. PrasadaRao	Associate Professor of Ophthalmology SiddarthaMedical College, Vijayawada AndhraPradesh, INDIA

Introduction:

Visual impairment and blindness according to WHO(World Health Organization)

Key facts

- 285 million people are estimated to be visually impaired worldwide: 39 million are blind and 246 have low vision.
- About 90% of the worlds visually impaired live in low-income settings.
- 82% of people living with blindness are aged 50 and above.
- Globally, uncorrected refractive errors are the main cause of moderate and severe visual impairment; cataracts remain the leading cause of blindness in middle- and low-income countries.
- The number of people visually impaired from infectious diseases has reduced in the last 20 years according to global estimates work.
- 80% of all visual impairment can be prevented or cured.

There are 4 levels of visual function, according to the International Classification of Diseases -10 (Update and Revision 2006):

1. Normal vision,
2. Moderate visual impairment
3. Severe visual impairment
4. Blindness.

Moderate visual impairment combined with severe visual impairment are grouped under the term *"low vision"*: low vision taken together with blindness represents all visual impairment.

Globally the major causes of visual impairment are:

- uncorrected refractive errors (myopia, hyperopia or astigmatism), 43 %
- unoperated cataract, 33%
- Glaucoma, 2%.

Approximately 90% of visually impaired people live in developing countries.

About 65 % of all people who are visually impaired are aged 50 and older, while this age group comprises about 20 % of the world's population. With an increasing elderly population in many countries, more people will be at risk of visual impairment due to chronic eye diseases and ageing processes.

An estimated 19 million children are visually impaired. Of these, 12 million children are visually impaired due to refractive errors, a condition that could be easily diagnosed and corrected. 1.4 million are irreversibly blind for the rest of their lives and need visual rehabilitation interventions for a full psychological and personal development.

Overall, visual impairment worldwide has decreased since the early estimates in 1990s. This is despite an ageing global elderly population. This decrease is principally the result of a reduction in visual impairment from infectious diseases through:

- overall socioeconomic development;
- concerted public health action;
- increased availability of eye care services;
- Awareness of the general population about solutions to the problems related to visual impairment (surgery, refraction devices, etc.).

Globally, 80% of all visual impairment can be prevented or cured. Areas of progress over the last 20 years include:

- Governments established national programmes and regulations to prevent and control visual impairment;
- Eye care services increasingly available and progressively integrated into primary and secondary health care systems, with a focus on the provision of services that are high quality, available and affordable;
- Campaigns to educate about visual function importance and raise awareness, including school-based education; and
- Stronger government leadership on international partnerships, with increasing engagement of the private sector.

Data over the last 20 years shows that there has been significant progress in preventing and curing visual impairment in many countries. Furthermore, the massive reduction in onchocerciasis- and trachoma-related blindness is part of a significant reduction in the disease distribution and has substantially reduced the burden resulting from these infectious diseases. This has been achieved through a number of successful international public-private partnerships.

Specific achievements include:

- Brazil which in the last decade has been providing eye care services through the national social security system;
- Morocoo which has launched a public effort to control glaucoma;
- China which has invested over 100 million dollars in cataract surgeries since 2009;
- Oman has completely integrated eye care service provision in the primary health care framework over the last decade; and
- India since 1995 has made available funds for eye care service provision for the poorest at district level.

The largest civil society effort to prevent and cure blinding dis-

ease and rehabilitate people whose irreversibly visually impaired or blind is the SightFirst programme of the International Association of the Lions Club (LIONS). Among others, this programme supports the largest initiative to develop child eye care centres (45 national reference paediatric centres established in 35 countries so far), implemented in partnership with WHO.

WHO coordinates the international efforts to reduce visual impairments. It's role is to:

- monitor the worldwide trends of visual impairment by country and by region;
- develop policies and strategies to prevent blindness appropriate for various development settings;
- to give technical assistance to Member States and partners;
- to plan, monitor and evaluate programmes; and
- to coordinate effective international partnerships in support of national efforts.

In 2013, the World Health Assembly approved the 2014-19 Action Plan for the universal access to eye health, a roadmap for Member States, WHO Secretariat and international partners with the aim of achieving a measurable reduction of 25% of avoidable visual impairments by 2019.

WHO works to strengthen national and country-level efforts to eliminate avoidable blindness, help national health care providers treat eye diseases, expand access to eye health services, and increase rehabilitation for people with residual visual impairment or who are blind. Building accessible and comprehensive health systems is the focus of this decade.

WHO leads several international alliances of governments, private sector and civil society organizations aiming at contributing to the elimination of blinding diseases. It also provides technical leadership to specific disease efforts which are deployed by its partners or the private sector to eliminate trachoma from the world by the year 2020.

For the last two decades WHO has worked with a network of international partners and private sector to ensure that appropriate, updated, good quality eye care solutions were made available to the people in need.

Since 2004, WHO in partnership with Lions Clubs International has established a global network of 45 childhood blindness centres in 35 countries for the preservation, restoration or rehabilitation of sight in children. This unique and innovative global project has served so far more than 150 million children and will open 10 additional eye care service centres for the children in 10 new countries in 2014. The centres will help combat to fight avoidable childhood blindness and help securing a future with full visual function for the children in need of care.

In response to the increasing burden of chronic eye disease WHO is coordinating a global research effort to map services and policies for controlling diabetic retinopathy, glaucoma, age-related macular degeneration and refractive errors.

Finally, to support comprehensive eye care systems, WHO continues to provide epidemiologic and public health technical support to its Member States.

National Programme for Control of Blindness
National Programme for Control of Blindness was launched in the year 1976 as a 100% Centrally Sponsored scheme with the goal to reduce the prevalence of blindness from 1.4% to 0.3%. As per Survey in 2001-02, prevalence of blindness is estimated to be 1.1%. Rapid Survey on Avoidable Blindness conducted under NPCB during 2006-07 showed reduction in the prevalence of blindness from 1.1% (2001-02) to 1% (2006-07). Various activities/initiatives undertaken during the Five Year Plans under NPCB are targeted towards achieving the goal of reducing the prevalence of blindness to 0.3% by the year 2020. Main causes of blindness are as follows: - Cataract (62.6%) Refractive Error (19.70%) Corneal Blindness (0.90%), Glaucoma (5.80%), Surgical Complication (1.20%) Posterior Capsular Opacification (0.90%) Posterior Segment Disorder (4.70%), Others (4.19%) Estimated National Prevalence of Childhood Blindness /Low Vision is 0.80 per thousand.

***SADAREM:**

Software for Assessment of Disabled for Access Rehabilitation and EmpowerMent

Objective of the SADAREM initiative is to create a Dynamic Web enable system for comprehensive access, rehabilitation and empowerment, through automation, capacity building, assessment of persons with disabilities (PWDs) and maintaining Decision Support System (DSS).
Government of Andhra Pradesh has taken this initiative of Identifying & Creating the Centralized Database for Person with Disabilities by using scientific approach & disability guidelines.

SADAREM ICT solution is designed to cover the following features:

- Scientific assessment of degree of the disability is done on the basis of methods and formulas prescribed in the Gazette 2001 issued by the Ministry of Social Justice and Empowerment, Govt. of India
- Generation of a computer based Disability Certificate with unique ID.
- Assessment of needs and maintaining the centralized data base. Software will also generate all the details including the support services that the disabled persons are entitled, based on the need assessment and record the services provided.
- The database thus generated will be hosted in the Public Domain to enable service providers to reach out to the disabled persons.

Aims & Objectives:

The aim of the present study is to evaluate the causes of blindness, in various visual disability groups, according to age, gender and the anatomic site of involvement, based on visual handicap certificate issued by the Ophthalmic surgeon, under SADAREM survey.

The various causes will be categorized as preventable and non-preventable causes.

The present study will provide opportunity to plan future strategies, to prevent visual handicap and to provide facilities for their rehabilitation, in this area , by the government agencies and other voluntary organizations.

Materials and Methods:

A total of 1354 patients who came for obtaining visual disability certificates were retrospectively analyzed, at a tertiary care hospital/teaching hospital, in Krishna district, Andhrapradesh, India.

Age, Gender, percentage of visual disability, cause of disability and anatomical site of involvement of disease are retrieved from the records.

The visual handicap certificates were issued based on the guidelines of "G.O.Ms No 31. Dated 01-12-2009."

Volume : 4 | Issue : 7 | July 2015 • ISSN No 2277 - 8179

VISUAL DISABILITY:

1. Definition: - Blindness refers to a condition where a person's suffers from any of the condition, namely,

i) Total absence of sight; or
ii) Visual acuity not exceeding 6/60 or 20/200(snellen) in the better eye with best correcting lenses; or
iii) Limitation of field of vision subtending an angle of 20 degree or worse;

2. Low Vision: - Persons with low vision means a person a with impairment of Vision of less than 6/18 to 6/60 with best correction in the better eye or impairment of field in any one of the following categories:-

a) Reduction of fields less than 50 degrees
b) Heminaopia with macular involvement
c) Altitudinal defect involving lower fields.

3. Categories of Visual Disability. All with correction

Category	Better eye	Worse eye	% age impairment
Category 0	6/9-6/18	6/24 to 6/36	20%
Category I	6/18-6/36	6/60 to Nil	40%
Category II	6/40-4/60 or field of vision 10o -20o	3/60 to Nil	75%
Category III	3/60 to 1/60 or field of vision 10o	F.C. at 1 ft. to Nil	100%
Category IV	*F. C. at 1 ft. to Nil or field of vision 10o	F.C. at 1 ft. to Nil	100%
One eyed persons	6/6	F. C. at 1 ft. to Nil or field of vision 10o	30%

*F.C. means Finger Count

4. Process of Certification

A disability certificate shall be issued by a Medical Board duly constituted by the Central/State Government having, at least three members. Out of which, at least one member shall be a specialist in Ophthalmology.

Results:

1354 subjects, whose ages ranged from Day 1 to more than 60yrs constituted the study group.

There were 796(58.78%) males and 558(41.21%) females; Male to female ratio was 1.4:1.

(Ref table 1 & 2)

Table 1: Showing distribution of the subjects, according to age.

Visual Deformity Group/ Category	0-15yr		16-40yr		41-60yr		>60	
	Total	%	Total	%	Total	%	Total	%
100%	69	5.09%	389	28.72%	256	18.90%	116	8.56%
75%	14	1.03%	58	4.28%	42	3.10%	6	0.44%
40%	15	1.10%	45	3.32%	76	5.61%	27	1.99%
30%	12	0.88%	97	7.16%	109	8.05%	23	1.69%
Total	110	8.12%	589	43.50%	483	35.67%	172	12.70%

Table 2: showing distribution , according to Gender.

VisualDeformity Group/ Category	Number of Males	% of males	Number of females	% of females
100%	468	34.12%	362	26.73%
75%	77	5.68%	43	3.17%
40%	93	6.86%	70	5.16%
30%	158	11.66%	83	6.12%
Total	796	58.78%	558	41.21%

The percentage of disability was 100% in 830(61.28%) subjects, 75% in 120(10.88%) and 40% in 163(12.03%) subjects. 30% visual impairment was noted in 241(17.79%) where only one eye was involved.(Ref table 3)

Table 3 showing distribution of subjects according to the degree of Visual Deformity.

Visual Deformity percentage Category	Total number of patients	Total percentage %
100%	830	61.29%
75%	120	8.86%
40%	163	12.04%
30%	241	17.80%
Total	1354	100%

Percentage of visual deformity is accorded as proposed by the ministry of social justice and empowerment.(Ref Ministry of social Justice and empowerment. Guidelines for evaluation of various disabilities and procedure for certification. Notification dated 1st june 2001. The Gazette of India extraordinary . Part 1. Section 1. No 154)

Out of 1354 people, 110(8.12%) were in the pediatric age group(ie from Day 1-12yrs) , 589(43.5%) are between 13 and 40yrs and 483(35.67%) are between 41-60yrs. 172(12.7%) were above 60yrs of age.

In the present study, out of a total of 1354 cases, the most common anatomical site involved was Retina and optic nerve, which constituted 640(47.26%) of cases, with 100% visual impairment in 489 subjects. This was closely followed by the involvement of cornea in 389(28.72%) of subjects, with 100% visual disability in 167(12.33%) subjects.

Orbit and globe were involved in 101(7.45%) of cases with 74(5.46%) cases showing 100% disability.(Ref table 4)

Table 4:showing the distribution of visual deformity, according to anatomical site.

Visual Deformity Group/ Category	Cornea		Angle of AC		Uvea		Retina & optic nerve		Orbit & globe	
	Total	%	Total	%	Total	%	Total	%	Total	%
100%	167	12.33%	74	5.46%	30	2.22%	489	36.12%	70	5.17%
75%	23	1.69%	11	0.82%	5	0.37%	72	5.32%	9	0.66%
40%	50	3.69%	9	0.66%	2	0.15%	56	4.14%	46	3.40%
30%	149	11.00%	7	0.52%	16	1.18%	23	1.69%	46	3.40%
Total	389	28.72%	101	7.46%	53	3.92%	640	47.27%	171	12.63%

In the present study, out of 1354 cases of severe visual impairment and permanent blindness, the most common cause was due to congenital anomalies, constituting 626(46.3%) cases, with 100% disability in 452(33.38%) cases and 76(5.61%) with 30% visual disability, wherein only one eye was involved. This was closely followed by various diseases and infections, majority of times a preventable cause, was identified , in 516(38.10%) of cases.

Trauma or accident as a cause of visual impairment was identified in 91(6.72%) of cases with 12(0.88%) showing 100% *disability.*

Hereditary causes were identified in 70(5.16%) of cases, with 100% visual disability in 63 cases(4,65%)

Table no 5: showing % of congenital & acquired causes of visual disability

Visual Deformity %	Hereditary/ Congenital		Acquired		Total	
	Total	%	Total	%	Total	%
100%	515	38.04%	315	23.26%	830	61.30%
75%	61	4.51%	59	4.35%	120	8.86%
40%	45	3.33%	118	8.71%	163	12.04%
30%	76	5.62%	165	12.18%	241	17.80%
Total	697	51.50%	657	48.50%	1354	100%

Table 6: showing the etiology in 30% visual disability group (unilateral cases)

S.no:	etiology	No: of cases
1	Phthisis bulbi/atrophic bulbi	126
2	Total corneal opacity /luecoma	42
3	Empty socket	29
4	Anophthalmos/microphthalmos	12
5	Post uveitic sequalae	1
6	Optic atrophy	23
7	Stephyloma	5
8	Congenital cataract	2
9	Traumatic cataract	1
	Total	241

Table 7: showing the etiological factors in 40% Visual disability group.

S.no	Etiology	No of cases
1	Phthisis bulbi/ atrophic bulbi	52
2	Anophthalmos/microphthalmos	15
3	Empty socket	3
4	Total corneal opacity /Leucoma	17
5	Macular degenerations	25
6	Stephyloma	4
7	Optic atrophy	29
8	Retinitis pigmentosa / Hereditary Retinal Dystrophies	8
9	Glaucoma	5
10	High Myopia with chorioretinal degenerations	2
11	Macular Chorio retinitis	2
12	Congenital Coloboma of uvea-Retina	1
	Total	163

Table 8: showing etiological factors in 75% visual disability group.

S.no:	Etiology	No: of cases
1	Microphthalmos / Anophthalmos	9
2	Retinitis pigmentosa / Hereditary Retinal Dystrophies	13
3	Macular degenerations	8
4	Glaucoma	4
5	Phthisis bulbi / atrophic bulbi	32
6	Optic atrophy	26
7	Corneal opacity / luecoma	9
8	Microphthalmos / Anophthalmos	10
9	Congenital Coloboma of uvea-Retina	3
10	High Myopia with chorioretinal degenerations	5
11	Retinal detachment	1
	Total	120

Table 9: showing etiological factors in100% visual disability group.

S.no:	Etiology	No: of cases
1	Retinitis pigmentosa / Hereditary Retinal Dystrophies	314
2	Glaucoma	168
3	Macular degenerations	44
4	Phthisis bulbi / atrophic bulbi	52
5	Optic atrophy	29
6	Corneal opacity / luecoma	50
7	Microphthalmos / Anophthalmos	76
8	Coloboma of uvea	3
9	Diabetic retinopathy	16
10	High Myopia with chorioretinal degenerations	11
11	Stephyloma	22
12	Retinal detachment	29
13	Macular Chorio retinitis	14
14	Albinism	2
	Total	830

Discussion:-

In Andhra Pradesh all types of disability persons in total are 8,05,369 which are given 4 phases of SADAREM & Society for Elimination of Rural Poverty(SERP).

Out of which visual disability is 1,15,833.(14.38%)

Table 11: showing statistics by courtesy of DRDA-SADAREM-phase I, II, III, IV.
(From 2010 June to 2014 December.)

District	*Ortho*	*Visual*	*Hearing*	*M.R.*	*Mental illness*	*Multiple disability*	*Total*
Anantapur	*49229*	*12982*	*17743*	*9660*	*1460*	*62*	*91136*
Chittoor	*45575*	*9528*	*15910*	*7453*	*2243*	*787*	*81496*
East Godavari	*55625*	*14395*	*13397*	*9706*	*1676*	*669*	*95468*
Guntur	*39009*	*6114*	*6715*	*6542*	*145*	*11*	*58536*
Kadapa	*22857*	*5789*	*13226*	*5799*	*1055*	*13*	*48739*
Krishna	*33429*	*7037*	*9639*	*10491*	*777*	*956*	*62329*
Kurnool	*38758*	*7341*	*8901*	*5030*	*173*	*3*	*60206*
Prakasam	*26774*	*8647*	*7908*	*5808*	*585*	*192*	*49914*
SPS Nellore	*23093*	*8089*	*7291*	*4261*	*924*	*593*	*44251*
Srikakulam	*26043*	*10552*	*6754*	*4824*	*0*	*170*	*48343*
Visakapatnam	*31058*	*8059*	*7837*	*7067*	*198*	*99*	*54318*
Vizayanagaram	*25628*	*10005*	*7327*	*4034*	*269*	*28*	*47291*
West Godavari	*35248*	*7295*	*9814*	*10214*	*688*	*83*	*63342*
Total	*452326*	*115833*	*132462*	*90889*	*10193*	*3666*	*805369*

The leading cause of all types of disability is orthopedic problems due to RTA, next leading cause is hearing problems due to ageing and ophthalmic problems are the 3rd leading cause, of all the types of disability , due to the causes,discussed below.

In New Andhra Pradesh, Ananthapur district has highest incidence of all the types of disability. However, visual disability has the highest incidence in East Godavari district .

The Krishna district ,with a population of 45, 29,009, out of which 41.00% are urban and literacy rate of 74.37%, 62,329 people are identified as disabled , including 7,037 of visual disability. (11.29%)

Out of these 7037 people, 1354 were issued disability certificates from Dept. of Ophthalmology Siddhartha Medical College/Government General Hospital, Vijayawada.

There have been many surveys in abroad and India regarding the prevalence of blindness in the community. They provide important information related to the causes of blindness and help the health planners to put strategies to decrease the prevalence of blindness. Evidence-based information is important to plan

low vision care and rehabilitation services. Obtaining a visual handicap certificate is a part of rehabilitation of a blind person. It helps the blind person to obtain travel and income tax benefit. Data collected in this study may be useful to the governmental agencies to plan the strategies for rehabilitation and prevention.

The study followed the criteria set by the Ministry of Social Justice and Empowerment for complete blindness. The study deals with those individuals who were certified blind and not visually impaired. We had to exclude individuals with unilateral blindness, as both India and W.H.O. definitions of blindness depend on the bilateral (better eye) cause of blindness.

In our study, 1354 persons received permanent visual disability certificates through Department of Ophthalmology, Siddhartha medical college, Vijayawada during June2010 - December2014.

Major visual disability group is 100 %(61.29%), most effected age group is middle age group (75%) and males are more affected than females (58.78%) in all types of visual disability groups.

Anatomical involvement of visual disability is retina & optic nerve in 47.27% cases, followed by cornea in 28.72%.

Congenital / hereditary diseases are more common (51.50%) in 30% - 40% visual disability groups. Major defect is phthisis bulbi due to corneal trauma / diseases.In100% - 75% visual disability groups, most common disease is retinitis pigmentosa/HRD.

Retinitis pigmentosa (RP) is the leading cause for obtaining visual handicap certificate. This could be related to the increased consanguinity and lack of genetic counseling in the area. The pedigree and clinical analysis of RP patients was beyond the scope of this study. A study done on RP patients in various states of India has shown an autosomal-recessive, predominant inheritance pattern, and more than 92% of cases in autosomal-recessive category had positive history of consanguinity.

Thirty-nine (13.99%) patients had corneal blindness, which was the second major cause for obtaining handicap certification. It was seen in the form of corneal scar (opacity). Majority of the patients had bilateral opacity, suggesting vitamin A deficiency precipitated by measles or debilitation. This can be avoided by improving awareness about the intake of vitamin A-rich food and immunization against measles. A survey carried out in a tertiary care eye hospital, Hyderabad, India has shown 11.6% patients had corneal opacities.

Summary and Conclusion:

In 100% visual disability groups &75% visual disability groups:

Predominant visual deformity category is 100% group, constituting 61.29%. Predominant age group is 16-40years (33.00%) followed by41-60 year's age group (22.00%) Predominant gender is male (39.80%) Predominant anatomical cause for permanent blindness is retinal disorders (41.44%) Predominant etiological cause is congenital & hereditary (42.55%). Predominant disease is Retinitis pigmentosa / HRD. So, it suggests that, 100% disability group require rehabilitation & socio economic support.

In 40% visual disability group:

Predominant age group is 41-60 years, followed by 16-40 year's age group Predominant gender is male Predominant cause is phthisis bulbi due to corneal diseases or trauma In this group to reduce the visual disability, early diagnosis and prompt treatment is required.

In 30% visual disability group:_ These are one eyed persons.

Predominant age group is 41-60 years, followed by 16-40 year's age group.

Predominant gender is male.

Predominant cause is phthisis bulbi / leucoma mostly due to acquired corneal diseases, like post traumatic or post infectious.

In this group to reduce the visual disability, early diagnosis and prompt treatment is necessary and they also require socio-economic support,as this group do not get any monitory benefit from government.

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